INTRODUCTION TO SURVIVAL

What is meant by the word survival? (definitions to be given by audience). The definition of Webster is, "To outlive, to remain alive after the death of others, or to live through anything else that may have happened". In the Oxford Dictionary, it means "to continue to live, that is, not to die".

If you are stranded, alone or with other survivors, on sea, in the desert, the jungle or in the cold north country, you will find that you will have to overcome not only personal fears, but adverse conditions around you. Personal fears can be overcome by the will to survive but you must have some knowledge in knowing how to live in uninhabitated locations with only meagre resources. It cannot be too strongly impressed on all personnel, that what they are learning in this course is for their own personal benefit and to provide them with as much knowledge as possible so that if they are ever forced down in uninhabitated regions, they will be able to exist until help arrives. It is a personal insurance policy, with this knowledge as the premium and the life of each individual as the benefit. Think that last sentence over and decide if you want to live to collect your own benefits! Unless full advantage is taken of the training offered, it is not only possible, but probable, that if you are forced down in isolated country, you will not come out alive, but will die through starvation, exposure, or accident.

In order to visualize the predicament into which one may get in the event of a forced landing in the bush whether in summer or winter, it is only necessary to picture one's self standing beside the wreckage of an airplane, three hundred miles from the nearest habitation with nothing except what is on your back. Anyone can realize that this situation is anything but desirable. However, if you have absorbed the training and principles available in this course of instruction, you will be in a position to do many things that can be done to keep yourself alive until help arrives. It is also important that you not only know what to do, but what not to do.

It must always be remembered, that it is possible for human beings to exist on their own resources but, through the gradual process of civilization where it is not necessary to practice these accomplishments, this capability has been slowly lost to individuals until when left without the little comforts of life that we know, such as electricity, heat, running water, etc., the result is that the human being, unless he is taught how to live, - dies, and unless you learn how to live in the bush without the aids and comforts you have been accustomed to, you, will have the distinct privilege of dying there. The uninhabitated wastes of the world are cold and impersonal. They do not care if you live there or not. Make nature work for you instead of against you, and if you know how to adapt yourself to the new environment, your existence can not only be secure, but in many instances pleasant.

Too often, the attitude is assumed that "it can't happen to me". We fly over hundreds of miles of absolute wilderness in which there does not exist a living soul, and we have no knowledge or comprehension of what is below. In one hour we cover three to four hundred miles

little realizing that if our means of transportation should fail, it would take as much as one year to cover the same ground, or else die in the attempt.

When operating in uninhabitated country, one never knows when one will be forced to exist on his own resources with what little he has managed to bring with him, so let us not go unprepared, or when the occasion arrives, TIME is the only advantage which you will have with you. TIME in which to remember what you did not do. TIME to think of the things you wish you had with you and TIME to plan what you are going to do.

You are the one who is going to perish unless you learn and understand what you are going to be taught, and only you alone can profit from the bitter or profitable experiences of others. It is better to learn and to have with you <u>now</u>, than to <u>not</u> have with you <u>then</u>.

SURVIVAL MANUAL

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PARACHUTE JUMPING AND LANDING TECHNIQUES

26 April 1951

LECTURES FOR INSTRUCTORS

BASIC SURVIVAL TRAINING

I. Title and Duration

a. Title: Parachute Jumping and Landing Techniques.

b. Duration: One (1) academic hour.

Four (4) hours practice and domonstration.

II. Objectives

a. To teach air crew personnel the correct jumping and landing techniques.

b. To impress air crew personnel with the importance of a safe exit from the aircraft and a safe landing.

III. References

a. None

IV. Training Aids

a. None

V. Presentation

a. Introduction. At the present time in the Air Force thirty-three percent or one out of every three airmen who bail out of an aircraft sustain some type of major injury. This rate is alarming when we consider the extra burden placed on personnel under actual survival conditions by having to take care of injured personnel. It is even more complicated and serious if this survival happens to be in enemy held territory. The first prerequisite for

successful survival is to reach the ground uninjured. That is the reason for familiarizing air crew personnel in proper bailout procedures and landing techniques at this school. The lecture for this period is divided into four phases.

1. Bailout procedure.
2. Control of the parachute in the air.
3. Parachute landing techniques.
4. Collapsing the parachute.

b. Procedures

1. Bailout Procedure.

(a) Parachute harness adjustment.

Parachute harness adjustments are practically eliminated when using newer type parachutes. However the old type harness still has to be adjusted to fit each individual. It is of primary importance that each crew member insure proper fitting of his parachute harness as a safety precaution and also to prevent possible injury.

(b) Correct exit procedure.

The Aircraft Commander should have dry runs on practice bailouts with his crew to eliminate confusion and a waste of time in the event of an actual emergency. Everyone should know which exit he will use, also a secondary exit in the event it is impossible to reach his main exit. Aircraft Commanders should time their crews to determine the length of time it will take for their crews to bail out. It might mean the difference of a bailout at low level or an attempted crash landing.

(c) The Correct Rip-Cord Procedure.

(1) At the first sign of an emergency the crew should be alerted. The Aircraft Commander will order the crew to prepare to bail out. At this time the crew will make all preparations for abandoning the aircraft; (Check equipment, kits, etc.). The Aircraft Commander should let the crew know the plane's altitude so they can plan a delayed or quick opening. When the Aircraft Commander gives the bail out signal or order the crew will move quickly and directly to their exit and bail out. After crew members have bailed out the Aircraft Commander should check on his interphone to determine if everyone has left the aircraft.

(2) The exit you make and the body position you assume on leaving the aircraft will depend on the type of exit opening. If the hatch is so arranged, face forward and squat to the rear of the hatch. Then roll out with your knees tucked under your chin. This is a "cannonball".

(3) When jumping from narrow side doors, crouch slightly, hold both sides of the door -- then propel yourself out with both arms and legs.

(4) When jumping from wide side doors, especially at any speed above 130 to 150 mph, leave from the rear edge. Use your arms, if possible, to help speed your exit. Dive forward and down.

(5) If exit doors are fairly close to tail surface radomes, etc., curl into a "cannonball" as soon as you leave. This

reduces body drag. While you will fall no faster for the first few seconds, your forward speed will drop off more slowly. Thus for a given distance aft of the door, you will be farther below the airplane "cannonballed" than if you had remained erect.

(6) Keep your eyes open.

(d) Body Position.

(1) Tuck your chin down on your chest so you can see the ripcord handle. Don't get your head upright. Rubber-necking at this point is not recommended. When your parachute canopy opens, it comes out fast. You shouldn't put your head in a position where a riser, a connector link or a pilot parachute can argue about the right-of-way.

(2) Cross your hands on your chest. Keep them there until you're ready to pull the ripcord handle. The preferred body position should be held until the parachute opens. Don't wave your arms and legs; it will make you spin very rapidly. While spinning won't really hurt you, it can make altitude hard to judge. Whether you bail out manually, through an escape tunnel, or with an ejection seat, remember to assume proper body position before pulling the ripcord.

(3) If you jump with a chest parachute, body position is slightly different:

(a) Turn your head until you're looking straight out over either shoulder, to avoid shroud line burns.

(b) Cross your hands across your body below the pack, until ready to pull the ripcord handle. In this position the arms won't retard the opening.

(e) Pulling the Ripcord.

(1) Opening a parachute is a simple operation. If you have a seat or back parachute, grasp the ripcord handle with your right hand and also hook the thumb of your left hand in the handle. On seat and back parachutes, there is slack in the ripcord system. So, with both hands, pull the ripcord handle away from your body hard and fast, to the length of your arms. Try to pull the ripcord cable free of the housing.

(2) If you have a chest parachute, hold the bottom of the pack with your left hand and grasp the ripcord handle with your right hand. Pull the ripcord handle with a hard, fast yank and follow through, pulling the handle completely free of the pack.

(3) Put your feet together and hold them there. It's easiest if you bend at the waist, as though you were sitting stifflegged in a chair.

2. Control of the Parachute in the Air.

(a) After your chute is fully open the first thing you should do is to look up and check the canopy. If there should happen to be a suspension line or a group of suspension lines over the canopy, grasp the riser that controls those particular lines and shake them off the canopy. CAUTION: Do not cut the suspension lines as you will lose the support of your parachute canopy.

(b) Checking oscillation. After your chute is fully opened, uneven escape of air will usually cause an oscillation. This leads to your weight swinging under the parachute canopy, pendulum fashion. This oscillating, if allowed to continue, can prove dangerous upon landing, so you should correct it. Use extreme caution in attempting to correct oscillation below 500 feet. This is a good method: With your chute fully opened, there are four risers extending above your head. Place your right hand well up on the front riser and your left hand on the left rear riser, pull down slowly and hold. After approximately 30 seconds, release very slowly. Do this several times if altitude will permit and oscillation should be negligible.

(c) Maneuvering the chute can help avoid dangerous ground objects. This is done by slipping the chute. In order to slip forward, reach well up on the two front risers and pull down as far as possible. This causes the air to spill out the rear of the canopy and the direction of your travel will be forward. To slip to the right, pull the right forward riser with your left hand and the right rear riser with your right hand. To slip to the rear pull down on the two rear risers. To slip to the left pull down of the left rear and left front risers with your left hand. CAUTION: Do not attempt to slip below 100 feet as the loss of air by spilling causes a faster rate of descent which may lead to broken bones.

3. Parachute Landing Techniques.

(a) The landing phase of a jump can mean the difference between walking away, if it is performed correctly, or being carried to the medics. It is in landing that the most non-fatal injuries occur. The most desirable landing, of course, is an open field, but one doesn't always have a choice; consequently, emphasis will be placed on the type of terrain landing most likely to be encountered.

(b) Open terrain. By the time you are 100 feet from the ground, all preparations to land should have been completed. The correct position of the body should be as follows: Feet and legs together; head and eyes up -- looking out to your front and not at the ground because a person has a tendency to pick up his feet just before he lands, causing serious injury to legs or back. At this time your hands should be grasping all four risers. When you land, your knees should be slightly bent. Try to land on the balls of your feet and then go into your parachute landing fall.

(c) Tree landing. When you're over a wooded area and you find it not advisable to slip your parachute to miss a tree or a group of trees, do the following: Be ready to land by the time you are 50 feet above the trees. Forget your risers, cross your arms in front of your face and keep them there. Keep feet and knees firmly together, but don't cross your legs, or you might break them on a limb. Don't be in a hurry to get down, after you stop. More men have been hurt trying to climb down than in actually landing in a tree. If you can, wait for rescue.

If you can't, you have hundreds of feet of suspension lines to use as a rope to let yourself down. Use your knife to cut some of the suspension lines, tie them to the tree and let yourself down.

(d) Overwater bailout.

(1) To bail out over water rather than ditch is a decision to be made by the Aircraft Commander in view of the existing circumstances -- the ditching characteristics of the plane, for example. Bailout is not recommended over a possible ditching unless visual contact is made with adequate surface help. If no rescue vessels are in the vicinity, bailout from bombers and transports should be used only as a last resort because of the extreme difficulty of getting the crew together in the water. The large life rafts offer more elaborate survival and signaling equipment than do one-man rafts. Fighter pilots have all their survival equipment attached to their chutes, and a bailout is preferred to ditching.

(2) In any but the warmest seas, a man will survive only a few hours if kept afloat by means of a life vest alone. The wearing of an exposure suit will increase this time considerably, but it still cannot compare with the time of survival possible in a life raft. In icy seas, an unprotected man will survive only a few minutes.

(3) If overwater bailout is required or decided upon, the following procedure is recommended:

(a) If surface help is available, head the airplane in a direction to allow the crew to drift into the course and just ahead of the rescue vessel.

(b) On the command "prepare for bailout", or when verbally ordered by the Commander or copilot, the crew will don exposure suits if available, then life vest and parachute harness. Be certain the air in the exposure suit is not trapped below the waist band. Make sure the individual one-man raft is snapped onto the parachute harness. The crew members should check each other to see that all equipment is in place.

(c) The man or men assigned should stand by to release the life rafts. If time permits, the rafts should be released and then the aircraft should circle twice over the rafts, bailing out half of the crew over the rafts on each pass. It is advisable to bail out as close together as possible so that it will not be so difficult to assemble the crew in the water.

(d) The best altitude for an overwater bailout of a crew is about 2,000 feet. By so doing you tend to keep the crew together. Low airspeed also aids in the bailout procedure. As the Aircraft Commander prepares to abandon the aircraft, he should engage the autopilot.

(e) Water Landing.

(1) WITH CLASS I HARNESS -- While you are several hundred feet above the water, push the sling under your buttocks with your thumbs. Then loosen the chest strap by pushing a lift web toward the fitting with one hand and unsnap the chest strap. Then lift your legs, one at a time, and unsnap the leg straps.

Cross your arms over your chest. When your feet touch the water, but not before, arch your back and throw both arms over your head. The harness will slip off. Then inflate your life vest and swim upwind, away from the canopy.

(2) WITH CLASS II HARNESS -- Pull the safety clip and turn the quick release box button to Unlocked, at about 1000 feet. When your feet touch the water, hit the button hard with a clenched fist. Arch your back and throw your arms over your head. If the wet leg straps don't want to unthread around the main sling, help them along.

(3) WITH CLASS III HARNESS -- At 1000 feet, loosen the quick-fit chest strap, then unsnap it. Loosen both leg straps and unsnap them if you want to; it doesn't matter. Put your right hand on the right canopy release, and your left hand on the left release. When your feet touch the water, operate both releases quickly. The canopy will drift away.

(f) Landing at Night.

In making a parachute landing at night, use the same method as described for a day landing in open terrain. If it is light enough for you to see objects on the ground, naturally you will check your oscillation, and slip to miss dangerous objects. If, however, it is too dark for you to see, keep your feet together, knees slightly bent, and hands well up on the risers. Hold this position, and as soon as your feet touch the ground, go into your parachute landing fall.

4. Collapsing the Parachute.

With a harness equipped with a quick release this is simple. Just let your chute go free. But, if you are unable to get out of your harness, you should if at all possible get to your feet and run to the leeward (downwind) side of the canopy. This will spill the air from the canopy, causing it to collapse. If the wind is blowing too hard to accomplish this, then roll over on your stomach and start pulling your bottom suspension lines in towards you. This will cause the air to spill from your canopy and collapse.

20 April 1951

LECTURE FOR INSTRUCTORS

BASIC SURVIVAL TRAINING

GROUND NAVIGATION AND ORIENTATION

I. TITLE AND DURATION

a. TITLE: GROUND NAVIGATION AND ORIENTATION.

b. DURATION: Three (3) Academic Hours

One (1) Hour Field Instruction

Two (2) Hours Training Films

II. OBJECTIVES

At the conclusion of this period of instruction and demonstration the student should know:

a. How to Read and Understand a Map

b. How to use the magnetic compass

c. How to use celestial bodies to establish position, direction and time.

III. REFERENCES

a. The Life Raft Book- Harold Gatty

b. Arctic Manual - TM-1-240, June 1944

c. Navigators Information File - USAF

d. Air Navigation - AAF TC

e. Handbook for Boys - Boy Scouts of America

f. Survival On Land And Sea - United States Navy

g. Map Reading For the Soldier - The Infantry Journal Inc.

IV. TRAINING AIDS

a. Training Films

(1) TF-21-2073- Basic Map Reading

(2) TF-21-2074- Basic Map Reading - Part IV

b. Magnetic Compasses - (One Per Student)

c. Maps and Charts

d. World Globe

e. Weems Plotter or Protractor

V. OUTLINE

This lecture has been divided into three parts as follows:

a. Part I - Map Reading One Hour

(1) Definition of a Map

(2) Map Symbols

(3) Contour Lines

(4) Distance Scales

(5) Latitude and Longitude

(6) How to use a Map

b. Part II - Use of the Magnetic Compass - One Hour

(1) Direction and the Magnetic Compass

(2) Variation and Local Magnetic Disturbances

(3) How to use the Lensatic Compass

c. Part III - Ground Celestial Navigation - one hour

(1) Direction by Celestial Bodies

(2) How to Determine Latitude and Longitude

(3) Methods of Determining Time.

VI. PRESENTATION

Introduction. Proficiency in map reading and in the use of the magnetic compass is an absolute necessity for successful ground navigation. The compass and map, when used together properly, will enable you to determine the course from one position to another, to follow that desired

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two or more landmarks of know position.

This lecture will present the application of elementary and emergency methods of determining direction and position. It is vitally important that all crew members become familiar with these procedures.

a. Map Reading.

(1) A map is, in it's primary conception, a conventionalized picture of the earth's surface as seen from above, simplified to bring out important details and lettered for added identification. A map represents what is known about the earth rather than what can be seen by an observer. However, a map is selective, in that only that information which is necessary for the map's intended use is included on any one map. Maps also commonly include features which are not visible on the earth, such as parallels, meridians, and political boundaries.

Since it is impossible to accurately portray a round object, such as the earth, on a flat surface, all maps have some elements of distortion. Depending on the maps intended use, some sacrifice constant scale for accuracy in measurement of angles, while others sacrifice accurate measurement of angles for a constant scale. However, most of the maps you will use for ground navigation will be a compromise projection in which a slight amount of distortion is introduced into the elements which a map portrays, but in which a fairly true picture is given.

(2) Map Symbols. By means of standard symbols maps show important roads, side roads, trails, towns, villages, woods, streams, lakes and all the features that help you recognize the terrain as you look at it or travel over it. Conventional signs ans symbols are standardized and are much the same on all maps. Those which require special

explanation and usually consists of

of most maps. A great deal of information which is necessary for the proper interpretation of a map is usually printed on the borders of the map. Always read the marginal information before using a map. It may save you from making serious mistakes.

(3) Contour Lines. Contour lines are the wiggly brown lines on a map and are drawn linking all points at a given height above sea level. You will note that these lines are broken at intervals and a figure inserted in the break such as 6,5000, 7,000, 7,500, or 8,000. These figures indicate the height of the contour line above mean sea level in feet. (Some foreign maps have the height indicated in meters, so be careful when using a map for the first time). Always check the marginal information to find the contour interval. Some of the lines carry no identifying numbers, but since the contour interval is known, the height of any unnumbered line can be determined by its relation to the numbered lines. For example: the contour interval is 100 feet and an unnumbered line is two lines away from the 9,000 foot line and three lines from the 9,500 foot line, the elevation at any point on the unnumbered line is obviously 9,200 feet. The height of any point on a map can be determined by reference to adjacent contour lines. Elevations are further indicated on maps and charts by measured elevations for the peak or highest point of a mountain. The arrangement of the contour lines indicate the form of the land. The contour lines around a ridge point downhill. The contour lines in a valley point upstream. The spacing of contours indicates the steepness of a slope. Contour lines close together indicate a steep slope. Contour lines which are far apart indicate a gentle slope. These are points for people who are travelling on foot to consider when planning a route.

where you want to go? Maps give this information by providing the user with a scale which hecan use to measure distances on the map. These scales can be used to find the distanceabetween any two points on the map. Lay any available straight edge, a folded piece of paper, a string, the edge of a pencil, or what-have-you, on the map so that it joins the two points. Mark on the edge of the straight edge the position of the two points. Lay the marked straight edge on the graphic scale and read off the distance directly. The same technique can be used to measure distance along a crooked course such as a road or river by breaking the course up into short straight segments.

(5) Longitude and Latitude

To describe a location in a city, the intersection of two streets is commonly used. Knowing the name of only one street establishes the general area of the location, but the intersection of two streets constitutes an exact location. In the same fashion, in order to locate a point on a map or chart you must indicate the coordinates of this particular point, in degrees of longitude and latitude.

a. Latitude can be described as a division of the surface of the earth into north and south. An imaginary circle, known as the Equator, drawn around the earth midway between the North and South Poles serves as the starting point. The surface of the earth north of the Equator is divided into ninety equal divisions by circles drawn parallel to the Equator. Each circle is called a Parallel of Latitude and is numbered starting from 0° at the Equator to 90° at the North Pole. Any parallel of Latitude North of the Equator is known as North Latitude. The earth's surface south of the Equator is divided in the same manner and is known as South Latitude. Each degree is further subdivided into sixty Divisions

called minutes. Using this system, we find Camp Carson, Colorado to be 38° and 45' North of the Equator.

b. Longitude can be described as an East and West division of the earth's surface. Longitude is measured in degrees East and West of a base line which passes through Greenwich, England. This line is a circle which passes through both the North and South Poles and is called the Prime Meridian. Longitude is divided into 360 equal parts or degrees. If you stand on the circle passing through Greenwich and face the North Pole, the circles on your left are numbered 1°W, 2°W, etc, to 180°W, and the ones on your right are numbered 1°E, 2°E, etc, to 180°E. 180°E and 180°W coincide and are identified as the International Date Line. Again by using this system, we find Camp Carson, Colorado to be 104° and 48' West of Greenwich.

c. All navigational maps and charts are laid out in Latitude and Longitude. The position of any point on the earth is described as so many degrees and minutes east or west of the Prime Meridian and so many degrees and minutes north or south of the Equator. To describe the exact location of Camp Carson, Colorado, we would say 38° and 45' north Latitude and 104° and 48' west Longitude.

(6) How to use a Map. How can the information on the map be used for ground navigation? This information can be used in several ways. First, you can locate your position on the ground by a comparison of the map with the terrain. Second, you can determine the best route from one point to another by reference to the map. The map shows you how to avoid rough terrain, and will help you plan the easiest route. The contour lines add a third dimension to the flat map and give you this information. Third, by marking your route on the map you have a record of your journey.

If you get off course, you can back track to the point where you made your mistake and start in again. Fourth, a man in a survival situation usually feels a lot better and approaches problems in a more confident manner if he knows exactly where he is. A map can give you that confident feeling.

b. Use of the Magnetic Compass

(1) Direction and the Magnetic Compass.

Direction is measured in degrees from North, Clockwise, through 360 degrees. The most common instrument for measuring direction is the Magnetic Compass. Since most emergency kits contain some type of magnetic compass, it is imperative that you know something of its use. Compasses will generally be marked in degrees from 0 to 360° by way of East which is 90°, South 180°, and West 270°. The easiest way to understand direction is to consider yourself to be at the center of a large compass. The 360 degrees of your compass dial are now 360 different paths or streets that you may use in following a map. The direction to a given point on the map is determined by measuring the angular distance clockwise from North to that Point. This angular distance, expressed in degrees, is the direction of that point from you.

(2) The term "North" is usually considered to mean the direction of the North Geographic Pole. The Compass needle points to the North Geographic Pole in only a few places on the surface of the earth. The reason for this is that the North and South Magnetic Poles do not coincide with the North and South Geographic Poles. In addition deposits of magnetic materials at various places keep the compass from pointing to the North Magnetic Pole. A magnetic compass, therefore, points not toward the North Geographic Pole, nor exactly toward the North

difference between true North and Magnetic North is called "Variation". Variation is represented on a map by lines joining points of equal variation and is expressed in degrees East and West of a Base Line where the variation is zero. If you are East of this line your compass will point West of True North and if you are West of this line your compass will point East of True North. The variation of any point is indicated in your maps; for example, the variation here at Camp Carson is approximately 13°E. This means that your compass will point 13 degrees East of True North. Therefore, if you were going to travel True North or 360° True North from here and maintain this direction with a magnetic compass you would have to follow a heading of 347° on the compass. In other words, you would travel 13° left of Magnetic North. A little rhyme that has long been in use to remember how to apply variation to the magnetic compass is: "East is least and West is Best".

(3) How to use the lensatic compass

(a) The lensatic compass may be held with the thumb through the holding ring, supporting the compass with the first two fingers. Hold it level so the card may swing freely on the pivot.

(b) Adjust the eyepiece until the fingers on the dial can be read plainly through the lens.

(c) The arrow at rest points to the magnetic north. The angle any line makes with the north line, measured clockwise from the north point, is the magnetic azimuth of that line.

(d) Hold the compass as directed in a and b above. Stand so that the arrow is under the stationary index.

(e) Turn your body either to the right or to the left.

The number now under the stationary index is the magnetic azimuth of the new line of sight.

(4) Determining azimuth

(a) To object on ground. To determine the azimuth of any object, alight the rear sight (slit in the eyepiece) and front sight (hair line in the compass cover) upon the object. The number under the stationary index is the desired magnetic azimuth.

(b) To object on map.

1 Draw a fine line on the map connecting your position and the object.

2 Orient the map by matching it with the terrain or by alighing the magnetic north line on the map with magnetic north as indicated by the compass.

3 Place the compass on the map, compass cover toward the object, with hair line in the lid directly over the line drawn on the map. The reading at the stationary index now indicated the desired magnetic azimuth.

(c) When a specific azimuth has been indicated, back azimuth is the opposite direction. Numerically it equals the original azimuth plus or minus 180°. (For example: The back azimuth of 120° is 120° plus 180° or 300°; the back azimuth of 200° is 200° -180° or 20°.) You can determine your position by the use of back azimuth. Take the azimuths of two or more points of known position such as mountain peaks. When drawn on a map, the intersection of the back azimuths of the known points gives your position.

(d) To march in a given direction.

1 Look through the lens and turn your body until the required azimuth is read.

2 Pick out a reference point in the line of sight.

3 March to the reference point by the most practicable route.

4 Repeat with successive reference points as often as necessary.

(5) Use of compass at night.

(a) Preparation.

1 Turn compass until the desired azimuth is next to the stationary index.

2 Turn the glass face until the luminous line is directly over the luminous arrow. The compass is now adjusted for marching on the desired azimuth. It can be carried with the cover closed so long as the glass face is not disturbed.

(b) Marching

1 Open the cover of the adjusted compass, being careful to hold it level so the dial will not bind. Raise the eyepiece and turn the compass until the luminous arrow comes to rest directly under the luminous line on the glass face.

2 Sight along the line of luminous dots and select some point on the skyline in the line or sight.

3 March to the selected point and repeat the process from there.

the compass will not function properly if it is close to iron or electrical fields. Rifles and knives should be laid aside when the compass is being used. Experiment to find how far your rifle or knife must be from the compass so as not to affect it.

c. Ground Celestial Navigation.

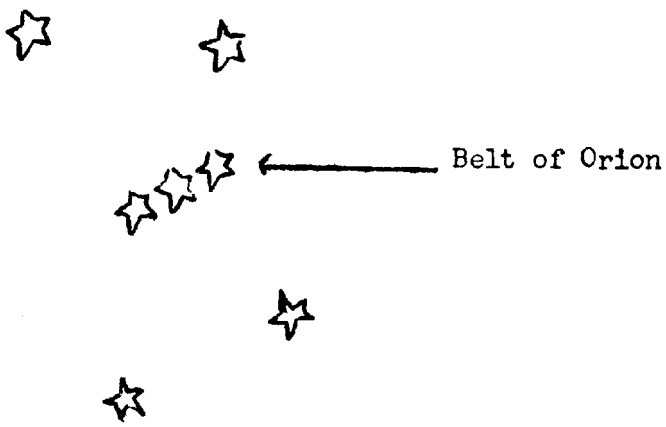
(1) Direction by Celestial Bodies.

(a) Direction by the Polar Star (Polaris). In the Northern Hemisphere, the star "Polaris" will be seen constantly in one position with nearby stars moving around it in a circle. "Polaris", as its name implies, is a Polar star. Since it is almost directly over the North Pole it can, for all practical purposes, be considered to be due North of you wherever you may be. On a clear night in the Northern Hemisphere, the easiest way of finding your North Point is by "Polaris". The unfortunate thing about Polaris is that it is not very bright and is sometimes hard to locate if the sky is hazy. The easiest way to find the Big Dipper, and then find Polaris as shown in the illustration. After you have determined True North, the other cardinal and intermediate points (East, West, and South) may then be determined. A crude compass may be constructed on the ground or traced in the sand or snow. Another pointer to Polaris is Mizar, the second star in the handle of the Big Dipper, to the Center Star of Cassiopea.

(b) Determining direction by the Sun. True North and South may be determined by the shadow cast by the sun. If your watch has kept accurate time, and you are familiar with the correct local time, the shadow cast by an object at 1200 will indicate North and South. In the Northern Hemisphere, the tip of the shadow will be North and the base,

vertical to the ground. Should you be without a watch, you may still obtain direction by the shadow cast by the sun. By following this method, select a level spot and impale a stick or some other straight object in the ground or snow. Start in the morning by marking the point at the tip of the shadow once each hour and continue throughout the afternoon. Connect these points and you will have a line which represents the shadow cast for that period of observation. The shortest distance between the base of the stick and the shadow line will indicate North and South.

(c) Direction by the Belt of Orion. The constellation of Orion consists of seven stars; the three close together are the brightest and most distictive. Whenever Orion can be observed, this star rises above a point on the horizon due East of you; Orion will set due West of you wherever you may be; Orion will pass directly overhead if you are on the Equator; finally, Orion will pass North of the Point directly overhead if you are in South Latitude and South of you if you are in North Latitude.

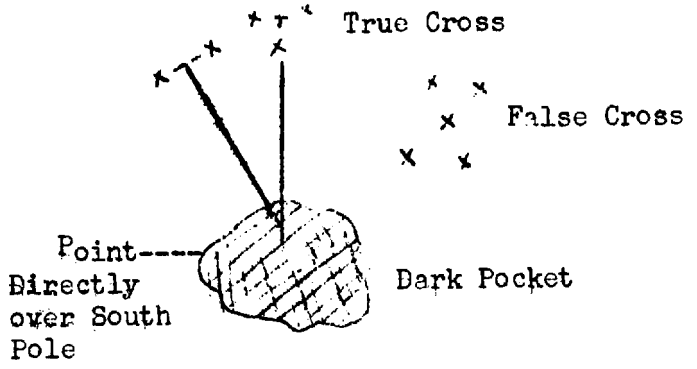


Belt of Orion.

(d) Direction by the Southern Cross. In the Southern

Hemisphere Polaris is not visible. There the Southern Cross is the most distinctive constellation. As you fly south the Southern Cross appears shortly before Polaris drops from sight. An imaginary line through the long axis of the Southern Cross or True Cross points toward the South Geographic Pole. The True Cross should not be confused with a smaller cross nearby known as the False Cross. The False Cross, though the stars are more widely spaced, is less bright. It has a star in the center, making five stars in all, while the True Cross consists of only four stars. Two of the stars in the Southern Cross are the brightest stars in the heavens. These bright stars are located on the southern and eastern arms of the cross. The stars on the northern and western arms, while bright, are smaller. There is no star above the South Pole to correspond to Polaris above the North Pole. In fact the point where such a star would be, if one existed, lies in a region devoid of stars. This point is so dark in comparison with the rest of the sky that it is known as the "Coal Sack".

The figure below not only shows the True Cross, but to the west of it the False Cross. Note, just to the east of the True Cross two very bright stars. By using these two stars in conjunction with the True Cross you can pretty accurately locate the spot within the "Coal Sack" which is directly above the South Pole. As in the figure below, extend an imaginary line along the long axis of the True Cross to the south. Join the two bright stars to the east of the cross with an imaginary line. Bisect this line with one at right angles. Where this east line intersects the one through the cross is (approximately) the point above the South Pole and can be used to indicate True South in the same manner in which Polaris is used to indicate True North.

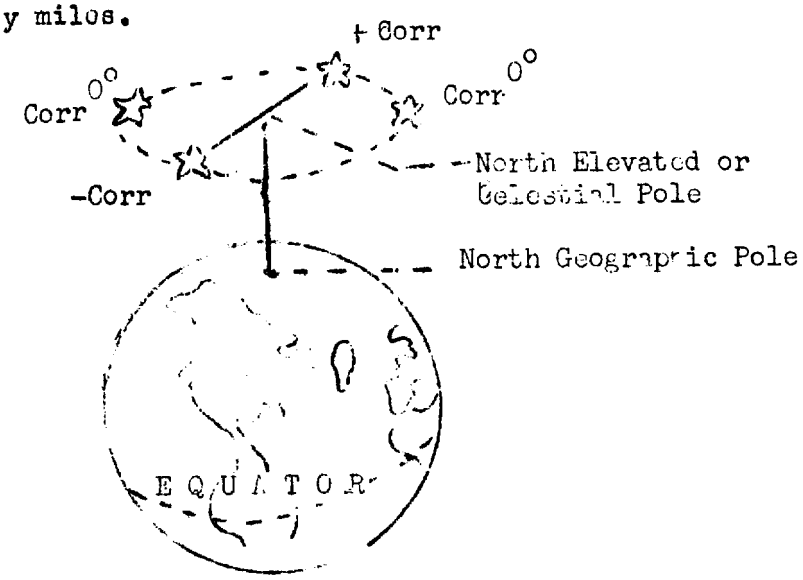


(c) We have discussed several methods by which you can find North, South, East and West by day or night. If you can determine any of the cardinal directions, you can easily determine the others. These are the only general rules. There are many local and some seasonal exceptions. Learn to pick out the stars which have been mentioned. Learn to look for them in the heavens. That is how the first navigators found their way, and without navigational instruments is still the most reliable. Determination of direction by use of a watch and the sun, which is included in most books on woodcraft and in many articles on emergency navigation has been omitted since errors as great as 24° can be made by this method.

Directions obtained from the sun or stars can be used directly or as a check on the compass. The difference between True North determined in this manner and Magnetic North on the compass is the variation for your present location. Checking magnetic variation can be very important to a man down in poorly mapped territory, since much of the surface of the earth, especially the Arctic, is poorly mapped magnetically. Also, small local magnetic fields which would be of no importance to a plane travelling 300 miles an hour can be very important to a man travelling only a few miles a day. Always make certain that you do not create any magnetic fields by having metal objects near when using the compass.

(a) How to determine Latitude and Longitude

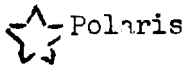
(a) Latitude by Polaris. The Pole Star or Polaris, (commonly known as the "North Star"), may also be used to determine latitude. Anywhere north of the Equator, the angle formed by Polaris and the horizon, as seen from your position, is a measure of the Latitude of that position. This simply means that if Polaris is 30° above the horizen, you are in 30° North Latitude; if it is 50° above the horizon, you are in 50° North Latitude, and if it is directly overhead, you are at 90° North Latitude or at the North Pole. Polaris does not coincide exactly with the the True North Pole but moves about this Pole as other stars do, in a circle which at present is never more than that of an arc of one degree or sixty minutes in radius. Since the circle is relatively small, Polaris can be used as an indication of the elevated pole by simply applying a small correction to the observed reading. When Polaris is in the same horizontal position as the True North Pole, its height above the horizon will constitute your latitude. When it is at the top or bottom of this small circle, there will be an error of one degree or sixty minutes, equivalent to sixty miles.

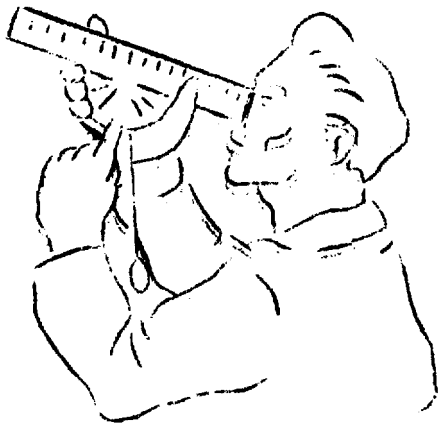


North Elevated Pole

Navigation tables contain corrections for these errors.

For our purpose this is hardly necessary as this error may be determined approximately in the following manner: At the end of the handle of the Big Dipper you will find the Alkaid star (also known as Benetnasch). When this star is directly below Polaris, Polairs is on top of its circle, and to obtain latitude at this time, subtract one degree from the height you measure. When it is below, it is necessary to add one degree. When Alkaid is in a horizontal line with the polar star, on either side of it, there is no correction and the angle you have measured will constitute exact Latitude. To measure the latitude or height of heavenly bodies above the horizon, navigators use an instrument called an octant. However, you may not have salvaged the octant, or if one is available, the navigator may be a casualty and there may be no one present knowing how to use it. In such a case, it will be necessary to devise some makeshift means to measure the angle between Polaris and the horizon. The Weems Aircraft Plotter provides a simple and reasonably accurate tool to accomplish this. Attach a plumb line to the grommet or hole in the center of the plotter. Put the Plotter to your eye and sight Polaris along the straight or plotting edge. Read the uncorrected latitude where the plumb line intersects the compass rose or protractor portion of the plotter. Apply the necessary correction described above to obtain your corrected latitude. A Weems Plotter is light, does not take up much space, and is carried in the E-1 Survival kit. If you are not familiar with its use, now is a good time to learn. A makeshift plotter can easily be constructed from cardboard, wood, or parts of the aircraft.





Sighting Polaris with the Weems Aircraft Plotter.

(b) Latitude by the duration of the day. Latitude can be determined by the duration of the day or the elapsed time between sunrise and sunset. Using this method, you will need a watch, an Air Almanac, or some sort of Astronomical Tables giving the time of sunrise and sunset for different Latitudes and dates. It does not matter to what particular time your watch is set as long as it is an accurate timepiece; but it is necessary for you to observe the sunrise in the morning and sunset in the evening. Check and wind your watch before sunrise and wait until the top of the sun is breaking the horizon line. Write down the time indicated on your watch. When the sun is setting, wait until the top of the sun is again in line with the horizon and note the time indicated on your watch. From the time observations that you have noted, you will be able to compute the number of hours between sunrise and sunset. In the Air Almanac, the times of sunrise and sunset are given for each two degrees of latitude. At a given latitude, the duration of the day will be the same anywhere along that latitude. After you have determined the duration of the day for your position, you are ready to use the Air Almanac. Look under the date of the day the observations were made, and find the times of sunrise and

sunset at various Latitudes. Compute the duration of the day at these Latitudes. When a figure is found which corresponds to the one obtained from your observations, the Latitude which has this number of hours of sunlight is the Latitude of your position. Since the time of sunrise and sunset is given for only each two degrees of latitude in the Air Almanac it will be necessary to calculate mathematically to obtain your Latitude whenever it varies from those listed.

(c) Latitude by Semiduration of Sunlight Graphs. Latitude can be quickly and accurately computed by using the graph entitled Semiduration of Sunlight in the back of the America Air Almanac. To use this graph you must know the number of hours from sunrise to sunset. In order to do this take the time of sunrise (when the top tip of the sun is in line with the horizon) and the time of sunset (when the top tip of the sun is again in line with the horizon). Half of this time will be the semiduration of the day. For example, if the total number of hours between sunrise and sunset is four hours the semiduration of sunlight is two hours. Each line running from the bottom of the graph forming an apex at the top is marked Oh, 1h, 2h etc. up to 12h, and indicated the number of hours of semi-duration of sunlight. The bottom of the graph gives the day of the months and knowing the semi-duration of sunlight and the day of the month the latitude can easily be read off the scale up the side of the graph. If the semi-duration of sunlight were 2 hours and the date were 16 November 1948, the latitude would be almost 70° 00' N or 69° 56' N. A little interpolation will be necessary each time but this can be done visually with accuracy to within 2 or 3 miles.

(d) Longitude by sunrise or sunset. Longitude also may be determined by sunrise or sunset if the date and Latitude are known and

an Air Almanac and a watch set on Greenwich mean time is available. Observe the Greenwich time just as the sun rises or sets. By looking in the Air Almanac under the date of the observation, and the latitude previously determined, the local time of sunrise may be found. Compare the time of sunrise or sunset at the position of the observation with the Greenwich time of sunrise or sunset. The figure you obtain will be the time difference between Greenwich and your position. To obtain Longitude from this difference in time you must convert time in corresponding arc degrees: Example: As the earth revolves around its axis, completing 360 degrees in 24 hours, one hour of time is equivalent to 15 degrees or arc. Let us suppose that at sunrise, your watch indicated 1940 GMT. From our Air Almanac we determine that Latitude and the date of local sunrise time is 0940. The time difference is 10 hours, and, when converted to arc (10 x 15) we find our Longitude to be 150 degrees West. If GMT is greater than local time, longitude is west of Greenwich; and if Greenwich time is less than local time, longitude is east of Greenwich.

(c) Longitude from local Apparent Noon. Without measuring the angular height of a celestial body, we can obtain a line of position by timing the moment the celestial body passes our meridian. The easiest celestial body to use in this manner is the sun. Use the same method as employed in finding direction by the sun, (Stick and Shadow Method) Observe the time on your watch when the shadow is shortest. If this is not Greenwich time convert it to Greenwich. You now note the time difference between local apparent time and Greenwich time and convert this time to degrees and minutes of arc to obtain the Longitude as in (d) above.

d. CONCLUSION.

(1) The capability for establishing position with some

degree of accuracy under survival conditions can be of vital importance. If radio equipment is available to transmit this position to rescue units, the survival time will be considerably reduced. If it is necessary to travel, both position and direction will be equally vital.

(2) The practice of these crude navigational measures, prior to an emergency will:

(a) Increase the accuracy of the results obtained.

(b) Increase your self-confidence should you be placed under survival conditions.

(c) Serve to establish these practices firmly enough in your memory so that they will not be forgotten.

(3) As in all survival training, the responsibility to learn emergency navigation practices remains with each individual.

1 APRIL 1950

LECTURE FOR INSTRUCTORS

BASIC EVASION AND ESCAPE TRAINING

Title: Ground Navigation
Lecture II Use of the Magnetic Compass

Duration: 1:00

References: FM 21-75 Scouting, Patrolling, and Sniping, 5 February 1944.

Training Aids: Mockup of lensatic compass or blackboard drawing of lensatic compass. Lensatic compass for each student. Tactical Map, Camp Carson and Vicinity for each student.

Notes for Instructors:

1. Since the object of this hour of instruction is to familiarize the student with the use of the magnetic compass, it is very important that each student have a compass in his hands while he is listening to the lecture.

2. It is equally important that the instructor have at hand a mockup of the lensatic compass or a blackboard drawing of the compass. The mockup or drawing should be large enough to be clearly visible to all students.

3. The instructor should indicate the operations he is describing on the mockup or drawing and the student should follow the lead of the instructor on his own compass. (To aid the student in mastering the nomenclature of the compass, the instructor should indicate the location of each part of the compass whenever he mentions it, and the student should find that part on his own compass).

4. If possible each student should be individually checked for proficiency in all manual operations covered in the lecture. To accomplish this the instructor will probably have to enlist the aid of the more proficient students.

5. If weather permits, this hour of instruction should be given outside so that part F., Field Demonstration can be integrated with the lecture.

6. It is recommended that a copy of this lecture outline be given to each student.

USE OF THE MAGNETIC COMPASS

A. Introduction

1. Proficiency in the use of the magnetic compass is an absolute necessity for successful ground navigation. The compass, when used properly, will enable you to find the course from one spot to another, to follow a given course, and to establish your position by measuring azimuths of two or more objects of known position.

2. The outstanding advantage of the compass as an emergency navigation device is that it can be used without regard to the conditions which limit other means of navigation. Darkness, poor visibility, or poor radio reception have no effect on the compass.

B. How to use the lensatic compass

1. The lensatic compass may be held with the thumb through the holding ring, supporting the compass with the first two fingers. Hold it level so the card may swing freely on the pivot.

2. Adjust the eyepiece until the figures on the dial can be read plainly through the lens.

3. The arrow at rest points to the magnetic north. The angle any line makes with the north line, measured clockwise from the north point, is the magnetic azimuth of that line.

4. Hold the compass as directed in 1 and 2 above. Stand so that the arrow is under the stationary index.

5. Turn your body either to the right of to the left. The number now under the stationary index is the magnetic azimuth of the new line of sight.

C. Determining azimuth

1. To object on ground. To determine the azimuth of any object, align the rear sight (slit in the eyepiece) and front sight (hair line in the compass cover) upon the object. The number under the stationary index is the desired magnetic azimuth.

2. To object on map.

(a) Draw a find line on the map connecting your position and the object.

(b) Orient the map by matching it with the terrain or by aligning the magnetic north line on the map with magnetic north as indicated by the compass.

(c) Place the compass on the map, compass cover toward the object, with hair line in the lid directly over the line drawn on the map. The reading at the stationary index now indicates the desired magnetic azimuth.

3. When a specific azimuth has been indicated, back azimuth is the opposite direction. Numerically it equals the original azimuth plus or minus 180°. (For example: the back azimuth of 120° is 120° plus 180° or 300°; the back azimuth of 200° is 200° -180° or 20°.) You can determine your position by the use of back azimuths. Take the azimuths of two or more points of known position such as mountain peaks. When drawn on a map, the intersection of the back azimuths of the known points gives your position.

4. To march in a given direction.

(a) Look through the lens and turn your body until the required azimuth is read.

(b) Pick out a reference point in the line of sight.

(c) March to the reference point by the most practicable route.

(d) Repeat with successive reference points as often as necessary.

D. Use of compass at night

1. Preparation

(a) Turn compass until the desired azimuth is next to the stationary index.

(b) Turn the glass face until the luminous line is directly over the luminous arrow. The compass is now adjusted for marching on the desired azimuth. It can be carried with the cover closed so long as the glass face is not disturbed.

2. Marching

(a) Open the cover of the adjusted compass, being careful to hold it level so the dial will not bind. Raise the eyepiece and turn the compass until the luminous arrow comes to rest directly under the luminous line on the glass face.

(b) Sight along the line of luminous dots and select some point on the skyline in the line or sight.

(c) March to the selected point and repeat the process from there.

E. Precautions in using the compass. Remember that the compass will not function properly if it is close to iron or electrical fields. Rifles and knives should be laid aside when the compass is being used. Experiment to find how far your rifle or knife must be from the compass so as not to affect it.

F. Field demonstration. (The instructor should demonstrate the uses of the compass outlined above. Each student should be checked on each use of the compass by the instructor or his assistants.)

1 April 1950

LECTURE FOR INSTRUCTORS

BASIC EVASION AND ESCAPE TRAINING

Title: Ground Navigation
Lecture III Ground Celestial Navigation

Duration: 1:00

References: None

Training Aids: A blackboard

Notes for Instructors:

1. This lecture has been prepared to explain how to navigate without instruments or without tables other than the very brief ones included in the lecture. Obviously a man with standard navigational equipment can navigate more accurately than a man with none. Therefore, point out to the students that if navigational equipment is available by all means use it.

2. Determination of direction by use of the watch and the sun, which is included in most books on woodcraft and in many articles of emergency navigation, has been omitted from this lecture since errors as great as 24° can be made by this method.

3. Determination of longitude by time of sunrise and sunset has also been omitted since in land navigation a suitable horizon is not present for the accurate measurement of time of sunrise and sunset. Furthermore, anomalous refraction over land would introduce errors which would invalidate this method even if a horizon were available.

4. Encourage discussion by experienced navigators in the class on the methods outlined in this lecture. It is entirely possible that some

of the students can suggest other methods of navigation as good as or better than those given here.

GROUND CELESTIAL NAVIGATION

A. Introduction

1. As most of you know, an aircraft navigator carries a small suitcase full of instruments and tables to enable him to practice celestial navigation. You also know that a person in a survival situation on the ground cannot carry all this gear. But, just what can we do in the way of ground celestial navigation without using navigation equipment and tables?

2. In the determination of position you can't do very much without an instrument to measure the altitudes of the celestial bodies. We will discuss this matter in detail later. But what we can do, without any instrument whatever, is to obtain direction from celestial bodies. We can use the celestial bodies either to aid in setting a course or to serve as a check on the accuracy of our compass. This may not seem like a very great aid to navigation, but in some instances, for example, when a man has no compass, his compass is damaged, or he does not know the magnetic variation in the area in which he is traveling. A knowledge of how to obtain direction from the stars may save his life.

B. How do we get direction from celestial bodies?

1. Direction from polaris. The land navigator in the northern hemisphere is fortunate in that one star, Polaris (the Pole star) is never more than approximately one degree from the Celestial North Pole. In other words, the line from any observer in the northern hemisphere to the Pole star is never more than a degree away from true north. We

find the Pole star by locating the Big Dipper or Cassiopea, two constellations (groups of stars) which are very close to the Celestial North Pole. The two stars on the outer edge of the Big Dipper are called the pointers, as they point almost directly to Polaris. If the pointers are obscured by clouds, Polaris can be identified by its relationship to the constellation Cassiopea. Diagram I indicated the relation between the Big Dipper, Polaris and Cassiopea.

The angular distance of Polaris from the meridian of the observer, the north-south line passing through the observer's position, can also be determined by the relative positions of Cassiopea and the Big Dipper. Diagram II illustrates positions of maximum error and of minimum error of Polaris. For positions between these extremes, the observer can make a mental interpolation to find the angular distance of Polaris from the celestial pole.

2. Direction from the sun at midday. A man with no instruments whatsoever can determine the north-south line through his position by observation of sun at midday. To do this put up a stick as nearly vertical as possible, check the alignment of the stick by sighting along the line of a makeshift plumb bob. (To make a plumb bob, tie any heavy object to a string. The line of the string indicates the vertical.) Sometime before midday commence marking the position of the shadow of the stick. Mark successive positions of the end of the shadow until the shadow can definitely be seen to lengthen. The line of the shadow when it is at its shortest position is the north-south line. In our operational area, the sun at all times of the year will be south of the observer at midday. Above the Arctic circle in the summer, this method can be used to obtain

DIAGRAM I

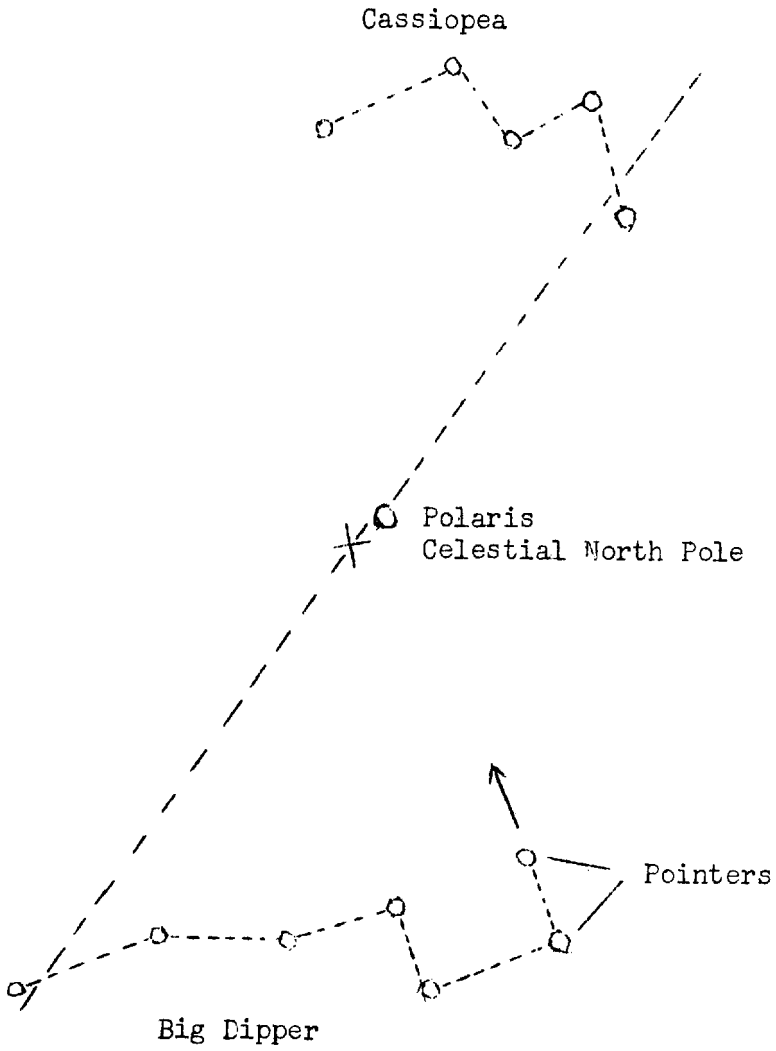
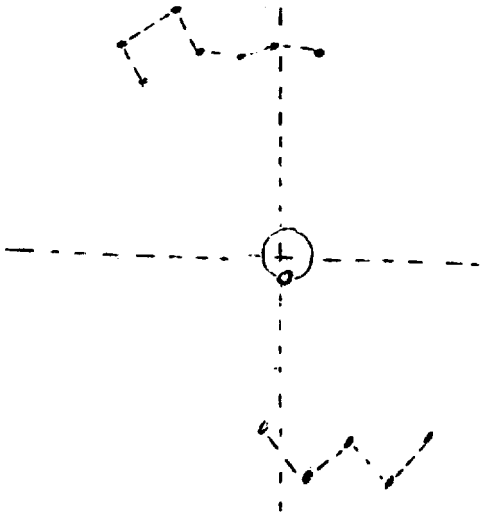
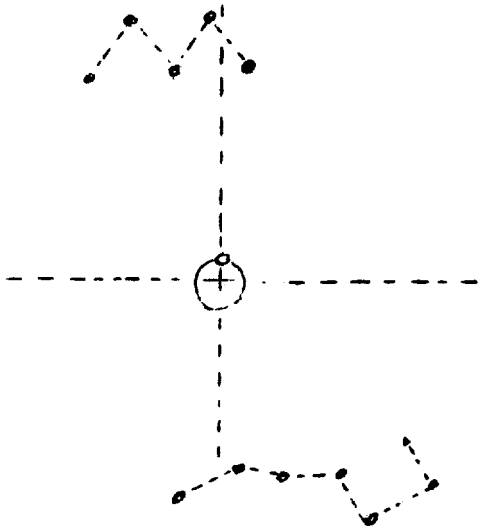


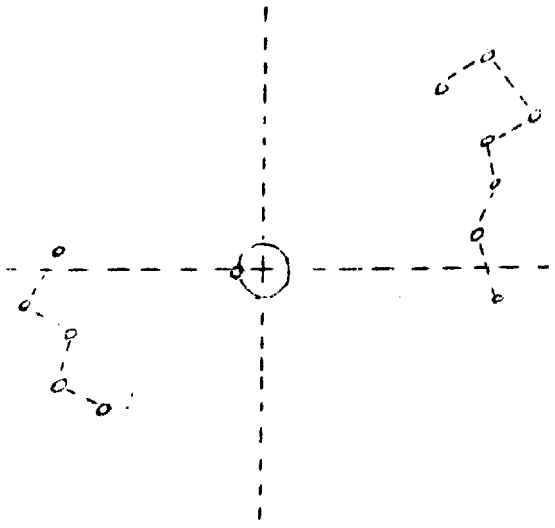
DIAGRAM II



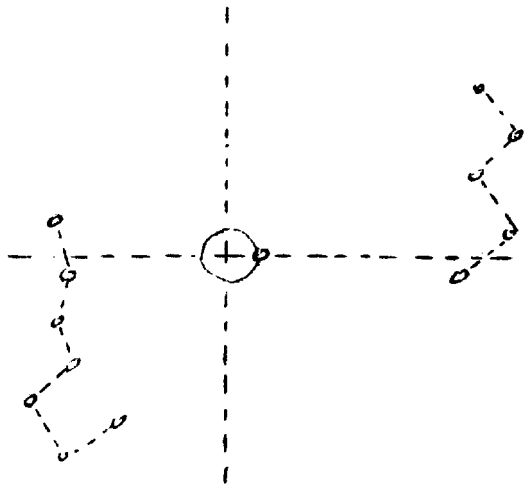
Polaris 1° below the Pole
and on the meridian



Polaris 1° above the Pole
and on the meridian



Polaris at the same altitude as the
Pole but 1° West of the meridian



Polaris at the same altitude as the
Pole but 1° East of the meridian

a north-south line at midnight. At midnight the sun will be north of the observer.

3. Direction from the sun at sunrise and sunset. By observing the position of the sun when it rises or sets, the observer can determine a reference line from which he can determine north. The following table shows the bearing from north of the sun when rising or setting for all months of the year in the northern hemisphere.

BEARING FROM NORTH WHEN RISING OR SETTING SUN

Latitude	Jan	Feb	Mar	Apr	May	June	July	Aug	Sep	Oct	Nov	Dec
N70°	----	130°	100°	60°	20°	----	----	50°	80°	120°	160°	----
60	140°	120	90	70	50	40°	40°	60	80	110	130	140°
50	120	110	90	70	60	50	60	70	90	100	120	130
40	120	110	90	80	70	60	60	70	90	100	110	120
30	110	110	90	80	70	60	60	70	90	100	110	120

(This table accurate to plus or minus 3°)

The table gives the bearing from north of the sun for the fifteenth day of each month. To find a bearing at any other day of the month, make a linear interpolation. In the morning the true azimuth of the sun will be the value given in the table. In the evening the true azimuth of the sun will be 360° minus the value given in the table.

4. Compass check. As we said above we can use the directions we obtained from the sun and stars either directly or as checks on the compass. To check your compass, sight on the heavenly body you are using as a reference, either Polaris or the sun, and note the magnetic azimuth of the body. The difference between this magnetic azimuth and the true

azimuth of the body will be the magnetic variation at your position. Note this variation, and check it with the variation given on your map. (For example: The magnetic azimuth of the sun at midday is 190°. The true azimuth is 180°. 190° -180° is 10°. The variation is 10°W. Subtract 10° from your magnetic azimuths to get true azimuths.) If it does not vary more than three degrees, make no change at that time, but check the variation again at the earliest opportunity. If even a small difference in variation is constant, adjust the magnetic north on your map to correspond with your observations.

Checking the magnetic variation can be very important to a man down in poorly mapped territory, since much of the surface of the earth, especially the Arctic, has not been well mapped magnetically. Also, small local variations which would be of no importance to a plane traveling 300 miles an hour can be very important to a man traveling twenty miles a day.

If you find a great discrepancy between a variation shown on your map and the variation you observe, first, make sure that you do not have any iron or electrical fields close to your compass. Iron may be present in the rocks around you, so observe carefully to see whether varying the distance of the compass from rocks will change the magnetic north as indicated by the compass.

C. How to find position by observation of celestial bodies.

1. The navigator with a sextant obtains position by observation of the height of a celestial body above the horizon, and by using this observed height can determine a line of position on the earth's surface. Without a sextant we are restricted to types of observation which do not involve measurement of angle.

2. Longitude from local apparent noon. Without measuring the angular height of a celestial body, we can obtain a line of position by timing the moment when the celestial body passes our meridian. The easiest body to do this with is the sun. Use the same set up as described above to find direction by the sun and note the Greenwich time of the shortest shadow of the stick.

Now correct this observed time of meridian passage for the equation of time, that is the number of minutes the real sun is ahead or behind the mean sun. (The mean sun was invented by astronomers to simplify the problems of measuring time. It rolls along the equator at a constant rate of 15° an hour. The real sun is not so considerate. It changes its angular rate of travel around the earth with the seasons.)

The following table gives the values in minutes of time to be added or subtracted to mean time (watch time) to get apparent time (sun time). (See page 9.)

Now that we have the Greenwich time of apparent noon we can find our longitude west of Greenwich by converting the interval between 1200 Greenwich noon and our local noon from time to arc. To do this remember that 1 hour equals 15° of longitude, 4 minutes equals 1° of longitude and 4 seconds equals 1' of longitude. (On February 4 the Greenwich time of local apparent noon is 20:10. The equation of time for February 4 is - 14 minutes. 20:10 -00:14 equals 19:56; 19:56 -12:00 equals 7:56; 7:56 of time equals 119° of longitude. Our meridian is 119°W.)

TABLE

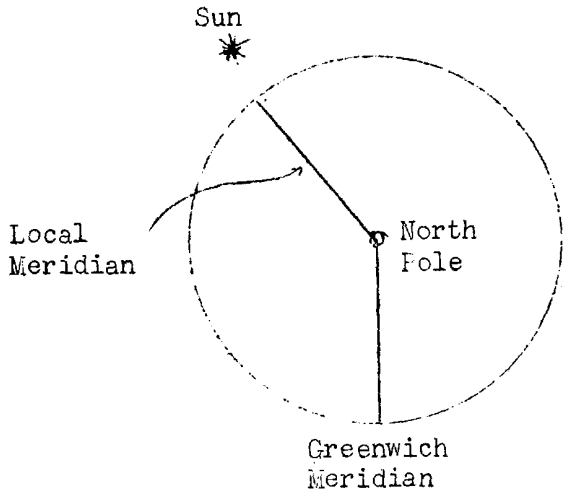
EQUATION OF TIME

DATE	EQUATION OF TIME*
Jan 1	-3.5 min
2	4.0
4	5.0
7	6.0
9	-7.0
12	8.0
14	9.0
17	10.0
20	11.0
24	12.0
Jan 28	-13.0
Feb 4	-14.0
13	14.3
19	14.0
Feb 26	-13.0
Mar 4	-12.0
8	11.0
12	10.0
16	9.0
19	8.0
22	7.0
26	6.0
Mar 29	-5.0
Apr 1	-4.0
5	3.0
8	2.0
12	-1.0
16	0.0
20	+1.0
Apr 25	2.0
May 2	+3.0 min
14	3.8
May 28	+3.0
Jun 4	+2.0
9	1.0
14	0.0
19	-1.0
23	2.0
Jun 28	-3.0
Jul 3	-4.0
9	5.0
18	6.0
Jul 27	-6.6
Aug 4	-6.0
12	5.0
17	4.0
22	3.0
26	2.0
Aug 29	-1.0
Sep 1	0.0
5	+1.0
8	2.0
10	3.0
13	4.0
16	+5.0
19	6.0
22	7.0
25	8.0
Sep 28	+9.0
Oct 1	+10.0 min
4	11.0
7	12.0
11	13.0
15	14.0
20	15.0
Oct 27	+16.0
Nov 4	+16.4
11	16.0
17	15.0
22	14.0
25	13.0
Nov 28	+12.0
Dec 1	+11.0
4	10.0
6	9.0
9	8.0
11	7.0
13	6.0
15	+5.0
17	4.0
19	3.0
21	2.0
23	+1.0
25	0.0
27	-1.0
29	-2.0
Dec 31	-3.0

*Add plus values to mean time and subtract minus values from watch time to get apparent time.

3. Longitude from local apparent midnight. To obtain longitude from local apparent midnight, the process is the same except that longitude is equal to the corrected Greenwich time of meridian passage and not the difference between noon and the corrected Greenwich time.

(Note to instructors: Work out several problems on longitude by meridian passage on the blackboard with the aid of the class. Use the diagram below to present the problem graphically.)



D. Celestial Bodies as Course Indicators

A celestial body near the horizon is often valuable as an aid to holding a course at night. Find a star on your line of march a few degrees above the horizon and use it as a guide in holding your course until it sets. A star is usually easier to keep in view than a terrestrial landmark.

Since the sun changes azimuth approximately 15° an hour, it can be used as rough check on direction at any time of the day once its azimuth has been established.

E. Field exercise.

A night class should be held to acquaint the students with the pointer system of locating Polaris.

26 April 1951

LECTURES FOR INSTRUCTORS

BASIC SURVIVAL TRAINING

PRIMITIVE LAND TRAVEL

I. TITLE AND DURATION

a. Title - Primitive Land Travel

b. Duration - One (1) academic hour

II. OBJECTIVES

At the conclusion of this period the student should know:

a. The requirements for land travel.

b. The requirements for the conservation of strength through the correct use of clothing and equipment.

c. Seasonal influences on travel

d. The requirements for patience, caution, and determination.

III. REFERENCES

a. Text references.

1. "The Friendly Arctic" - V. Stefansson

2. "The Arctic Manual" - V. Stefansson

3. "Survival on Moving Ice" - Captain T. P. Cunningham

4. Arctic Training School Pamphlets and Lectures

IV. TRAINING AIDS

a. Outdoor Training

b. Visual Demonstration

c. Training Films

d. 3904th Training Squadron Lectures

e. Diagram Nos. 15, 16, 17, 18, 20

V. PRESENTATION

a. Introduction. Primitive land navigation is based almost entirely on experience, and experience is acquired only by actual physical performance. However, experience may be acquired to a lesser degree through the intelligent application of certain practices, or through observation and instruction. As an example, travel routes may be established by observing the way a bird flies, the actions of wild animals, the way a tree grows, or even the shape of a snowdrift which would indicate the direction of prevailing winds. Compass bearings, or the use of the sun and stars implement these observations and confirm original headings. All these aids are influenced by the location and physical characteristics of the territories where they occur and by the seasons during which observations were made. Successful primitive "Land Navigation" presupposes the ability of the individual to survive, therefore the main concern of this lecture will be that of presenting actual travel problems and some of the principal rules related thereto. Never forget, however, that primitive travel depends on regional food supply. You must forage as you travel.

b. Land Travel.

1. Land Travel requires knowledge of various skills. No man can travel without possessing a general idea of the location of his ultimate destination. No man should have to travel without having been briefed on the country he will travel through and the character of the people he will meet, for if the population is hostile, his entire method of travel and existence must be adapted to these factors.

2. Wilderness travel requires continuous use of eyesight. A novice will view the landscape from the top of a hill with what he considers is care and interest and then say, "Let's go". The experienced man will clean his binoculars, settle down comfortably and start surveying the surrounding countryside carefully. A distant blur of mist may be smoke; a faint winding line on a far off hill may either be caused by a man or be an animal trail; a blur in the lowlands may be caused by a herd of caribou or cattle and the travel route for the next day may be planned after carefully reconnoitering the terrain. Distant landmarks must be studied carefully for characteristics that will insure their recognition from all other points or angles. A famous Indian hunter once pointed to his binoculars with a grin of satisfaction and said: "Sit down little time -- look in dis glass an' you walk one hundred miles".

3. Before you leave, study your back trail carefully. You should know your travel route "forwards and backwards" as game may move out of cover, after you have passed, to watch your future movements. A professional plains hunter once said, "An antelope's eyes see everything, but his eyes don't tell him much". Careful and intelligent observation will train you to interpret correctly the things you see, whether they are distant landmarks or a broken twig at your feet.

4. Topography.

(a) Mountains. Mountain ranges frequently affect climatic changes which in turn influence vegetation, animal and bird life and the character of people living in these areas. To illustrate this point, the ocean side of mountains will have more fog, and be subjected to more rain or snow than the inland side of a mountain range. So while forests

new snow on the ocean side, the inland side may be semi-arid. Therefore when crossing a mountain range, a complete change in route finding procedures and survival techniques may be required. Travel in a mountainous country is simplified by conspicuous drainage landmarks but is complicated by the roughness of terrain. The mountain traveler can readily determine the direction rivers flow. However, he will have to reconnoiter to determine whether a river is safe for rafting or a snowfield or mountainside can be traversed without danger. Mountain travel differs from travel in rolling or level country, as there are certain cardinal rules governing climbing methods. A party descending into a valley that becomes increasingly steep and where walls become progressively perpendicular, may be obligded to climb upward again and follow one of the ridges until easier descent is made. In such a situation, rappelling with a shroud line rope may save many weary miles. Avalanches of earth, rock and snow must be guarded against as well as crevasses on ice fields.

(b) Forests. Forests grow in humid areas. If forested areas are dense, river trails and ridges will be the easiest to follow. In open forests land travel is easy and provides for a greater choice of direction, but may be deficient in concealing cover. Along rivers, isolated homes, villages and towns will be found, and these may dictate changes in travel methods. Where populations are unfriendly, it will be necessary to travel at night.

(c) Northern and Arctic Prairies. In certain parts of the northern prairies, the direction of streams will be dificult to determine. Countless lakes with poor drainage may add to travel difficulties. Rain or fog may hide the sun, and at times the experienced traveler will be obliged to orient his course by observing landmarks caused by prevailing

is difficult and will continue to be so until streams, hills or a seacoast running in a definite direction come to his aid. Some of the principal landmarks to be observed by travelers are given below:

(1) Vegetation. Near a seacoast where prevailing winds blow inland from the ocean, thicket growth will be dead or stunted on the windward side, slowly increasing in height towards the lee. Individual trees will lean away from the prevailing wind and their branches will be thicker and longer on the leeward side.

(2) Sand. Sand contours are affected by wind, but less than snow. Old drifts formed by strong winds will be more firmly packed than recently formed drifts and sand will lie deeper on the leeward side.

(3) Snow. Under the heading "Telling direction by snowdrifts" Stefansson lists the following rules: "You should have learned the traits of drifts by studying snow surfaces after storms. The force, duration and other characteristics you know. Failing that, common sense (if you don't get into a panic) will tell you a lot. You can tell the direction of the wind by the fact that the drift is lower and narrower to windward and gets higher and wider to leeward before dropping down abruptly to a general level"...."Traveling by night, if there is diffused light, (so there are no shadows) or, in the event that it is so dark that you cannot see the drifts,

step and feel the drifts carefully with your feet, or drop on all fours and examine them with your hands."

6. Polar Ice. On polar ice, the traveler should proceed according to last known observations, based on the location of the nearest land and seasonal influences (See Survival on Ice.). This subject is broad in scope and there are very few men experienced in travel on the polar sea. By carefully reading books mentioned in III, "References", you can pick up additional information on this form of primitive travel. (For instructions in the use of snowdrifts in navigation on polar ice see page 348, The Arctic Manual, Stefansson.)

d. Glaciers. Many glaciers offer possible travel routes. Their main contribution to emergency travel is that they serve as avenues across and over mountain ranges. Glacier crossing demands special knowledge and techniques, such as the use of the life line and poles for locating crevasses. Shelters requiring a minimum number of tent poles and artificial heat such as gas stoves are desirable. There are, however, numerous places in the north, where mountain ranges could be negotiated on foot in one day, by following this method.

e. Requirement for the conservation of strength by proper use of clothing, equipment, and the ability to improvise.

Almost every survival procedure should be adapted to snow conditions. Methods for procuring food, types and use of shelters, clothing, fires and travel under arctic conditions become highly specialized. Here again experience is of the utmost importance, and the most valuable advice that can be given to a novice is to use extreme caution when travelling in sub-zero temperatures. Leonidas Soppela, one of the most experienced Alaskan trailsmen, refused to travel when temperatures fell to thirty below zero, unless there was some very important reason for doing so. "It is not that traveling in thirty degrees below zero may not be comfortable or pleasant", he stated, "but if anything goes wrong in those temperatures, you will be in for a bad time". "While children may play outdoors in sub-zero temperatures, children can retreat indoors at any desired moment." A strong wind, springing up even when the temperature is only a few degrees below zero, may place a man or party in a serious predicament if they are far from shelter. Use of snowshoes, proper "breaking" of winter trails, and other winter procedures will be taken up seperately as they require individual treatment. The most dangerous situation for a man is to be caught out at night when a blizzard is blowing. For if you struggle on aimlessly to the point of exhaustion, until your clothing is wet with perspiration, you are unwittingly committing suicide. When you fall down in a stupor, you will freeze. The first thing to do, if caught in a blizzard, is to make a shelter. A hole or cave hollowed out with a snowshoe will do. If possible, line the floor with boughs. Then roll up in your chute, tarp or extra clothing, putting most of it under you. "If you fall asleep you will freeze to death", is an old wive's tale, because when you get too cold you will awaken unless you are completely exhausted, and by steady

movement you can restore body heat and sleep again. Sleep will remove your worries, shorten the passage of time and strengthen you. The main thing is to see that you do not get caught without shelter. Long before the arrival of darkness you should have a comfortable snow cave hollowed out, lined with some brush and all other steps taken to insure your safety.

F. Seasonal Influence on Northern Travel.

1. Winter is considered the best time for land travel because rivers, lakes and muskegs are frozen and inequalities of the land surface are filled with snow.

2. Spring is usually the most difficult time for travel. Melted snow and spring rains, swollen rivers and lakes convert flat country into impassable marshes. With a good boat or raft, experienced men can navigate swift flowing rivers or flooded areas. However, during the period when ice-jams form, river navigation is dangerous.

3. Summer. During the summer season travel by night is preferable to travel by day. Land will dry out and rivers have returned to their normal levels. Under these conditions land and water travel will be excellent. During this season big game is dispersed, as the cows are in the process of dropping calves and insect pests disturb them. Wildfowl and their eggs will furnish an inexhaustable food supply, particularly along the cliffs of northern beaches where the seafowl gather. Small game as well as beds of edible shellfish in the shallow bays will free the traveler from the necessity of constant hunting. This of course reduces the time required for foraging and allows an increase in travel time. (See basic Lecture No. T.S. 12). The long hours of summer sun will reduce the need for fires. Mosquitos and other insects will be bothersome, in fact can become one of your greatest travel hazards. To get away from them, sleep on a raft

anchored in a lake or swing a parahammock fifteen to twenty feet up in the trees.

4. Autumn. Northern natives prefer winter for travel which permits the use of dog sleds, but the survival traveler will find autumn the season that affords the best travel. Streams will be low and clear, fording and rafting will be easier. Swamps will have dried and become hardened by night frosts. The departure of the wild fowl and the hibernation of rodents will increase dependence on large game but autumn heralds the rutting season with wide movements of caribou and moose. This aids the hunter in his foraging. Heavy crops of berries in sheltered localities will add variety to the food supply. The Indian Summer may lull you into the belief that winter is still far away, but no man should be drawn into a false sense of security as heavy snows may fall at any time. Every precaution for the approaching winter should be completed down to the last detail.

g. Fuel. (For information on Fire Building See Diagrams and Lecture on Outdoor Fires.) Fuel may play an important part in the selection of travel routes. The timberline traveler will descend to the spruce groves for overnight camping and the seacoast traveler will watch for a good supply of drift wood. On the southern coast of the Bearing Sea outcrops of coal are common. Many northern grasses make excellent fuel, not only as fire starters but also as a stable fuel. Green willow and alder generate hot fires and if laid in the form of a grill will aid starting a coal fire. Green willow branches thrown on the fire at night will form coals that la st until the morning. Plenty of good wood makes a happy camp, but while a fire constitutes the survivor's best friend it can develope into a dangerous enemy when it burns important equipment or clothing. Never leave a fire without

first taking every precaution to put it out.

h. Shelters. (Influence on Travel.) Except for the presence of mosquitos or for an occasional storm, summer shelters do not call for the requirements of winter shelters and could be roughly built. But even in summer, a poorly built camp never pays. The difference in time taken for a good or poor shelter and camp site is negligible. The proper care of equipment, clothes, and food depends on proper shelters and an orderly camp. In the fall, when the last mosquito has departed and a sky full of stars presages a clear night, fold your sleeping bag under a tarp, (to keep off the dew), and sleep in the open, but such nights are usually rare. There is one rule in camp making that never fails----stop early enough to insure a good night's rest. If you find everything you need to make a good camp, a half hour or so before you intend to stop traveling,--stop anyway, for complete rest predicates an early start the next morning. Details for construction of shelters will be found in lecture No. T. S. 5.

i. The Requirement for Patience, Caution and Determination. Rivers will always offer the easiest and fastest avenue of communication through the wilderness. In the summer the use of rafts or boats will insure speedy travel while in winter the frozen level river surfaces will afford easy walking. Large lakes or connecting systems of smaller waterways likewise provide good travel avenues. "Overflows", caused by river water flowing over the ice, are very dangerous in low temperatures. There is always danger from thin ice on both lakes and streams. If travelers will guard against this danger which may form, the level surfaces will allow for rapid traveling.

VI. CONCLUSIONS:

a. The novice is prone to follow a compass line, the experienced man follows the lines of least resistance and recognizes at a glance that a curved route may be shorter and easier; that an apparently innocuous stretch of forest may be filled with windfalls or that a smooth, green meadow is in reality an impenetrable line of beaver ponds.

b. Game trails can be used when they follow your projected course. Trails made by migrating caribou are frequently extensive and useful. On scree or rock slides, mountain sheep trails are very helpful. Moose and bear trails are almost always unreliable and frequently lead into almost impenetrable thickets or swamps. Equally promising routes may offer varying prspects, such as the chance of securing game or of locating water holes. In other words, route finding in wild country requires the highest degree of mental concentration, knowledge of wilderness "road signs", common sense and judgment. Fortunately trail-walking practices develop progressively and instinctively with time, and a clear mind will register observations and form deductions almost subconciously.

c. The characteristics of calmness, self-confidence, constant observation, courage, caution, and unlimited patience which are possessed by the best types of outdoor men, will also develop .

d. One last word of warning. In every traveling party there will be at least one individual who will not conform to travel rules. He will lack patience and the wisdom of the trained outdoorsman in the selection of trails, in the location of game, or in solving some of the countless problems that will develop during travel. He is the type of man who, if allowed to, will endanger the entire party. Your mission may be one that requires great skill in order to avoid the slightest error in

for securing the meat that may be desperately needed, or he may place the lives of the party in jeopardy. After a day or two in wild country you should begin to recognize which of your companions possess the necessary qualities for survival leadership. Your wisest move will be to back up their decisions with loyalty and the courage of your convictions.

9 MARCH 1950

LECTURE FOR INSTRUCTORS

BASIC SURVIVAL TRAINING

I. TITLE AND DURATION

a. Title - RIVERS AND RAFTS.

b. Duration - One (1) academic hour.

II. OBJECTIVES

At the conclusion of this period the student should know:

a. Types of rivers found in the North.

b. Effects of glaciers on rivers.

c. Methods of choosing fords.

d. Preparations for fording.

e. Use of a pole in dangerous fords.

f. Advantages of heavy pack in fording.

g. Fording: Two or more men.

h. Rafting principals.

i. Safeguarding firearms while rafting.

j. Method of raft navigation.

k. Construction of Sweeps.

l. Dangers of rafting.

m. Emergency boats.

III. REFERENCES

a. Arctic Training School. (Lectures and Diagrams)

b. Basic Training Lectures - 3904th Training Squadron.

IV. TRAINING AIDS

a. Outdoor Training.

b. Visual Demonstrations.

V. PRESENTATION

Introduction. The rivers of the North are of every imaginable type.

MOUNTAINS

Wherever mountains and highlands exist, the melting of the snows produce concentrations of water that pour downward in series of cateracts, falls and swift chutes, where current is churned to foam and the roar of the rapids drowns the human voice. Such rivers cannot be rafted or traveled in canoes, but at times they MUST BE CROSSED.

GLACIER RIVERS

Glacier rivers flowing from ice-caps, hanging, piedmont or serpentine, are notoriously treacherous. (Piedmont - lake like glaciers; Serpentine - winding or valley glaciers)

a. To begin with, northern glaciers may be vast in extent, and under the influence of the summer sun, the amount of water liberated may be unbelievable.

b. Ice is unpredictable. When looking at an ice-field from above, it may look innocent enough, but in reality, under its smooth looking surface, there may be countless sub-glacier streams and water reservoirs, either under a condition of draining or temporarily blocked up or dammed. Lakes a mile in extent may lie on the upper snowfield, waiting only for a movement in the glacier to become liberated and pour their millions of

gallons downward into the valleys below.

FLOODING GLACIERS

Glaciers from which the cataclysmical torrents of water descend, are called "flooding glaciers". They are of two types.

a. The type mentioned above carries water on its surface in the form of lakes.

b. The other is a glacier that in passing side valleys, dam them with ice, that causes the water to back up in the valley until in certain cases, large lakes are formed. These lakes continue to increase in size, until a crevasse or break in the moving ice wall comes opposite to the lake, which roars downward in an irresistible flood.

Flooding glaciers can be recognized from above by the flood swept character of the lower valleys. The influence of these glaciers is sometimes felt many miles below and prospectors have lost their lives while rafting otherwise safe rivers, by a sudden flood entering by a side tributary and descending in a wall of white water.

RISE AND FALL OF GLACIER RIVERS

All glacier rivers are subject to fluctuations in the water generated by sunlight. The peak of flood water is usually at its height in the afternoon, after the noonday effect of the sun on the ice. For sometime after the peak has passed, rivers draining the glaciers may be unfordable, or even unnavigable, but by waiting until midnight or the following morning, the water will have receded to a point when fording is safe and easy. In following a glacier river when it is broken up into many shifting channels, it is wise to choose routes that offer safe access to one of the banks to

escape being caught between two dangerous channels.

CHOOSING A FORD

No man traveling on foot through wild country can escape the necessity of fording streams. These may be the small ankle deep brooks that rush downward from side valleys, or the larger snow and ice-fed rivers that are so swift that water-borne boulders on the bottom, can be heard crashing together.

You have been advised that before fording such streams, if they are of glacial origin, they must be allowed to decrease in strength during the night hours.

This does not mean that fording means waiting, for no matter what the conditions are, you must find a ford that is basically safe, and this in turn, necessitates careful and experienced study.

If there is a commanding hill beside the river, leave your pack and, taking your rifle and binoculars, climb the hill and begin a careful examination of the valley. Look for:

a. Level stretches where the river is broken into numbers of channels, for a river, like an army, can best be defeated when separated.

b. Make sure that after a ford is discovered, you have an uninterrupted route on the further bank. If exceedingly rough cliffs come down to the river beyond your ford, you may find better travel on your own side.

c. Where a dyke of rocks cross the valley, there will be rapids or canyons. Make sure that you will be on the side where the travel is the easiest. Where heavy timber grows, the channel will be deeper.

In fording there must be a number of factors to remember:

a. Whenever possible, choose a course that leads across the current at about a 45 degree angle downstream.

b. Never ford directly above or even close to a rapid, waterfall, or a deep channel.

c. Always ford in a spot where, if you lose your footing or get rolled, you will wash up against a shallow bank or sandbar.

d. An occasional rock may help as it will break the current, but keep out of rocky places, as you may fall and break a leg.

e. Depth, if you can keep your feet, is not necessarily a deterrent. Deep water may run slower, it may be safer and you can always dry out later.

PREPARING TO FORD (ONE MAN)

If you are alone, before you commit yourself to the water, plan exactly what you are going to do and how you will do it. First you must take all possible precautions. If the ford looks pretty bad, take the following steps.

a. Remove your pants and underdrawers, and lash them securely to the top of your pack. The water will have less grip on your legs.

b. Keep on your shoes and socks, as they will protect your feet and ankles from boulders, and give you a firm footing.

c. Tie your rifle and binoculars securely to the top of your pack. If you are forced to release your pack, the chances are you can locate it eventually with your rifle and glasses, but if your rifle and binoculars fall by themselves, you will never recover them.

d. See that your pack is well up on your shoulders and that the slip nooses are in good operating condition in case you have to drop your pack.

You are now so prepared, that if you are swept from your feet, you can release your pack and, unencumbered, hold on to one end of your pack strap, and half swimming and half wading, fight your way to the further bank. Many men have been drowned by being unable to extricate themselves from their packs.

USE OF A POLE IN FORDING

If you are alone, there is one more precaution that you can take that sometime helps. If you can find a strong pole about 3½ inches in diameter at the big end, and about 8 feet long, take it along.

The pole is used on the UPSTREAM side to break the current. DO NOT USE IT ON THE DOWNSTREAM side, as the current will tend to push you down on the pole and lift your feet, in which case, it will do you more harm than good. Keep the pole grasped firmly on your upstream side. Get your feet firmly planted, lift the pole ahead and downstream a little and step below it. Keep the pole well slanted, so the force of the current will push the top downward on your hands and shoulder. On occasions, the pole will be a great help, but if you have to let it go, nothing has been lost, as you would have made the ford without it, if no poles were available.

ADVANTAGES OF A HEAVY PACK

Lastly, never worry about having a heavy pack on your back. Nothing helps more than weight in swift water, provided you can release it when necessary. George Washington in one of his diaries tells how, when he was

a young man traveling with Indians, they would shoulder a heavy stone on making a swift ford, to enable them to keep their feet. The amount of junk, rifle, glasses, axe, etc., on your pack will make it inadvisable to further complicate matters with a heavy stone, but it is well to remember that weight is a help.

FORDING (TWO OR MORE MEN)

Every man entering a swift ford should take the precautions and make the preparations listed above. When there is more than one man, however, the technique of using the pole is different.

The heaviest man forms the downstream anchor. The pole is held parallel with the current. The lightest man, on the upstream end, breaks the current so that those below move in the eddy formed by his body. If the current is coming from the right, the pole is grasped under the left armpit with the right hand extended. At times the upstream man may be temporarily swept from his feet, but as stated previously, the eddy thus formed will enable the man below to move with comparative ease. The route as always in fording, should be quartering downstream. Currents that are too strong for one man to stand against can be safely crossed in this manner. Experience in crossing swift rivers, enables a man to judge water with a high degree of accuracy, but like the farmer's pet bull, - the danger is always present.

RAFTING

Rafting rivers is one of the oldest forms of travel known. Under Survival conditions it is the best and quickest method of traveling. Rafts must be made of dry, dead, standing trees. Spruce, which is found on Arctic and subarctic rivers, make the best raft.

The greatest difficulty in constructing a raft, is making it strong enough to withstand the buffeting it will receive from rocks and swift water. Even if 6 or 8 inch spikes are available, which seldom occurs in wild country, they are not satisfactory, as they pull or twist out easily. Rope quickly wears out in contact with rocks and gravel.

Northern men have evolved a method of construction, which, while requiring neither of the above aids, produces a raft that is far superior in strength and which can be built with no other tools than an axe and sheath knife.

It is made by cutting inverted notches, that is, notches that are broader at the base than on top, on each log (see attached diagram) and then driving through these notches a three sided wooden cross piece that is about one foot longer than the width of the raft. Two such cross piece's are driven through notches at each end of the raft, on the top and bottom. The overhanging ends can be lashed for added strength, but the swelling of the cross pieces when immersed in water, will bind the raft together with great strength.

A raft for three men should be 12 or 13 feet long and 6 or 7 feet in width, depending on the size of the logs. The logs should be about 12 to 14 inches in diameter to handle easily and should be well matched so the notches can be level when the cross pieces are driven into place.

The raft should be built on two skid-logs sloped downward evenly on a beach and well smoothed with an axe so that the raft logs lie evenly. Small poles with straight edges or a string pulled taut should be used to mark the notches. When the end notches are completed at two ends of the raft, turn the logs over and drive the three sided cross pieces through on the

underneath side, then complete the top notches and drive the top cross pieces through. If too loose, the cross pieces can be checked with thin board-like pieces of wood split from a dead log. When the raft is in the water, the wood will swell and the cross pieces will become very tight and strong.

A deck of light poles on the top of the raft will be needed to keep your packs dry, but further precautions should be taken by wrapping them in some waterproof covering. Details of a steering sweep is shown in the accompanying diagram.

The most important part of your equipment will be your rifle, and nothing sinks faster than a gun. A raft is not "fool proof" and can turn over when it hits a rock or a "sweeper". The river beds of northern streams are liberally spotted with rifles that have been lost from rafts and canoes. Even when attached to rafts, rifles have gone to the bottom when the logs have been broken apart when hitting obstructions. If you tie your rifle to a raft, lash it firmly to ONE LOG - if the raft should be broken, you have a chance of recovering your rifle by going downstream and finding the log to which your rifle is tied, even if you have to swim for it.

RAFT NAVIGATION

Rafts can be steared by sweeps and poles. In fairly shallow water, a pole is the most efficient, but when the water is deep, the sweep is preferable.

Poles and sweeps should be used from both ends of the raft. The bow man can see any obstructions ahead and the stern man can follow his directions in steering. The poles are useful too, in pushing a raft in quiet

water. Perhaps the most important rule in navigating an unknown stream is to use caution in looking over stretches that may be dangerous. Swift water rapids, sharp bends where the current is strong and the view ahead obstructed, should be scouted, by beaching the raft and looking over the questionable stretch and planning the safest route. "Sweepers" are one of the most dangerous obstructions found on northern rivers. A "sweeper" is a large tree growing on a bank of a river which is being undermined by a swift current. As the bank is washed away, the tree begins to lean outward until it may actually bounce up and down on the current. One of the worst features of the sweeper is that a party may, in rounding a bend, be suddenly confronted with a sweeper that blocks the channel. Helpless in the swift water, there is little that a rafting party can do. Hundreds of men have met disaster through hitting sweepers in dangerous rapids. Landing above a bend and looking over the river ahead is the only safe method. Snags and sunken boulders make characteristic disturbances on the surface of the current which you soon learn to recognize. Navigation of rivers in unfriendly country, while possible, would be rendered more difficult by the necessity of navigating at night. Such navigation would of course, necessitate greater adherence to the precautionary methods just advocated, with the addition of camouflaging the raft during daylight hours.

While "hard and fast" rules are not always advisable - a valuable procedure is to always stay close to the point of a bend in a river. If the river bends to the left, keep close to the left point; if the river bends to the right, keep your raft close to the right bank. The water will be shallower on the points and you can jump out and ease a raft

gently around the point. For this purpose, a coil of rope or a painter of parachute shrouds should always be attached to the stern of the raft, for controlling it when necessary.

EMERGENCY BOATS

The only type of emergency boat that can be constructed quickly would be the type made from a tarpaulin or light canvas cover, stretched over a skillfully shaped framework of willow with a well formed keel of green wood such as a slender pine or spruce. Gunwales of slender saplings are attached to either end and equalized by spreaders or thwarts. The ribs made of strong willows are tied to the keel and the ends bent upward and tied to the gunwales. The frame is turned upside down and the canvas lashed on firmly. The inside of the frame is then covered with close lying willow to form a deck to stand on. Such a boat is easy to handle, buoyant and lacks only the property of strength needed for long journeys. For ferrying a party across a broad, quiet stretch of river, it is very satisfactory. With its mission completed, the canvas cover can be removed and taken along for use in making shelters.

Outside of the difficulties and problems presented by every form of wilderness travel, the navigation of streams that flow through wilderness areas possesses a charm and excitement that will remain as one of life's pleasantest memories.

LECTURE FOR INSTRUCTORS

BASIC SURVIVAL TRAINING

BACK PACKING

I TITLE AND DURATION

a. Title. Back Packing.

b. Duration. One-half ($\frac{1}{2}$) hour.

II OBJECTIVES

At the conclusion of this period the student should know:

a. Weight carrying principles.

b. Different types of primitive pack straps and their construction.

c. Construction and use of the tumpline.

III REFERENCES

a. Arctic Training School Lectures and Diagrams.

IV TRAINING AIDS

a. Visual aids.

b. Actual construction and use.

PRESENTATION

1. Introduction. In cases where there is no transpotation available and one is forced to carry heavy loads on his back over comparatively long distances, "back-packing," is a very useful necessity. While carrying a heavy load on one's back is burdensome, a suitable harness and other loading and carrying techniques can eliminate unnecessary hardships. Furthermore, a rational and philosophical attitude in carrying a back-pack is required, as this burden invariably develops mental irritation and fatigue both of which can result in hysteria or low morale. The experienced man has learned the following lessons in back-packing:

a. He keeps his mind occupied with other thoughts.

b. When resting he makes slight adjustments to improve the fit and comfort of the pack.

2. Sourdough Pack Straps. This type of pack strap can be made out of any material that is soft and strong, i.e., animal skin, canvas, and parachute harness webbing. Sourdough Pack Straps can be made up by following this procedure:

a. First make the chest strap. This should be approximately 12 inches long (outside measurement) and $3\frac{1}{2}$ inches wide. Soft material, such as an old sock, etc, should be used for padding; but care should be taken to maintain an even and flat surface to reduce or eliminate unnecessary body friction.

b. On the outer edges of the chest strap, two shoulder straps are sewed on. The shoulder straps should be $2\frac{1}{2}$ inches wide and long enough to extend from the chest strap over and beyond the shoulders, about $1\frac{1}{2}$ to 2 feet. The shoulder straps should be slightly padded.

a. On dangerous hillsides or while fording dangerous rivers, the pack can be released instantly by a pull on the slip knot. This aspect is particularly helpful when game is unexpectedly encountered.

b. For carrying snowshoes or a rifle, the broad top of the pack forms a firm and steady platform, while the shoulder straps keep them firmly in place.

c. The pack can be better adjusted to separate items than a pack-sack. Light, soft articles can be placed at the bottom and against the back, and hard and heavy items on top. Separate articles may be more easily located in the inside of a pack-sack. (See diagram: Sourdough Pack Assembly)

d. The pack, when properly assembled, is flat against the back; however, a full pack-sack becomes round, pulling heavily against the shoulders.

e. The padded chest band helps by taking some of the weight from the shoulder straps. The disadvantages of the fabric pack strap are:

(1) That pack must be assembled and lashed before it can be adjusted to the pack strap.

(2) That experience and ingenuity are necessary to use it at top efficiency.

4. Methods of Packing Meat.

a. Toggle and tendon method. This method is used with the smaller types of big game animals, such as antelopes, small deer, and the young of larger species. Using this method, you pack the entire animal either gutted or ungutted, depending on the circumstances. Beginning at the back of the knees, cut through the skin, half way to the foot. Then cut through the knee joint and pull the lower leg bone free of the skin, down to the lower end of the cut. This forms a rough "toggle." Then cut slits between the

hind legs and the "ham string tendons" large enough to force the front leg toggles through. The result is that each front leg becomes a shoulder strap, through which you can force your arms. The diagram will illustrate this principle. In this manner, animals weighing up to 1CO lbs dressed can be carried easily. Cutting the animal's head off to save weight is optional. If the animal has been gutted, it should be wiped clean in order to prevent clothing from getting bloodstained.

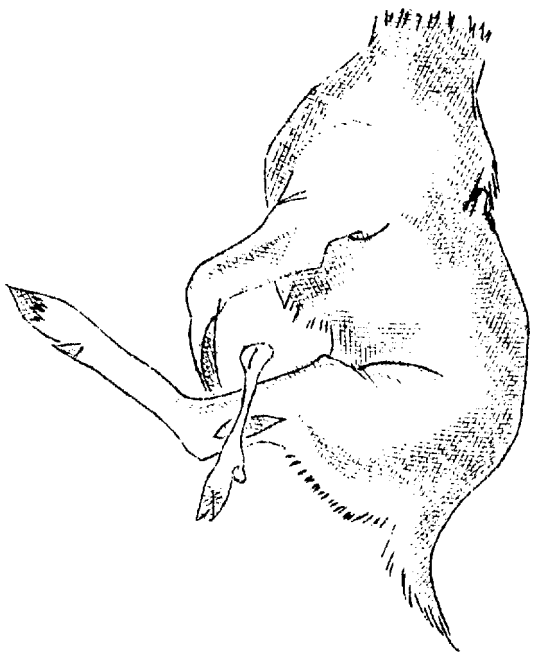


Fig 2

"TOGGLE AND TENDON" METHOD OF PACKING MEAT

b. Emergency Pack Straps. A regulation pack strap can also be used effectively in packing meat. This is a rather easy and simple method and consists of soft shoulder pads connected with rope, leather, or fabric lines that pass around the weight to be carried. A soft fabric pack-strap is easy to carry and is very well suited for survival purposes.

5. The Tumpline. Either of the above can be made in carrying heavy loads, but the best single aid to packing is to know how to make and use a tumpline. The tumpline can be made from any material that is strong and soft. Pieces of skin with the hair on, tanned skin, an old sock, or any soft fabric such as folded parachute fabric, will do. Many packers prefer to make their own tumpline, because most of those commercially make are usually too stiff and too thick. The tumpline should be long enough to reach over the forehead and down to a point opposide each ear. (See Figure 3.)

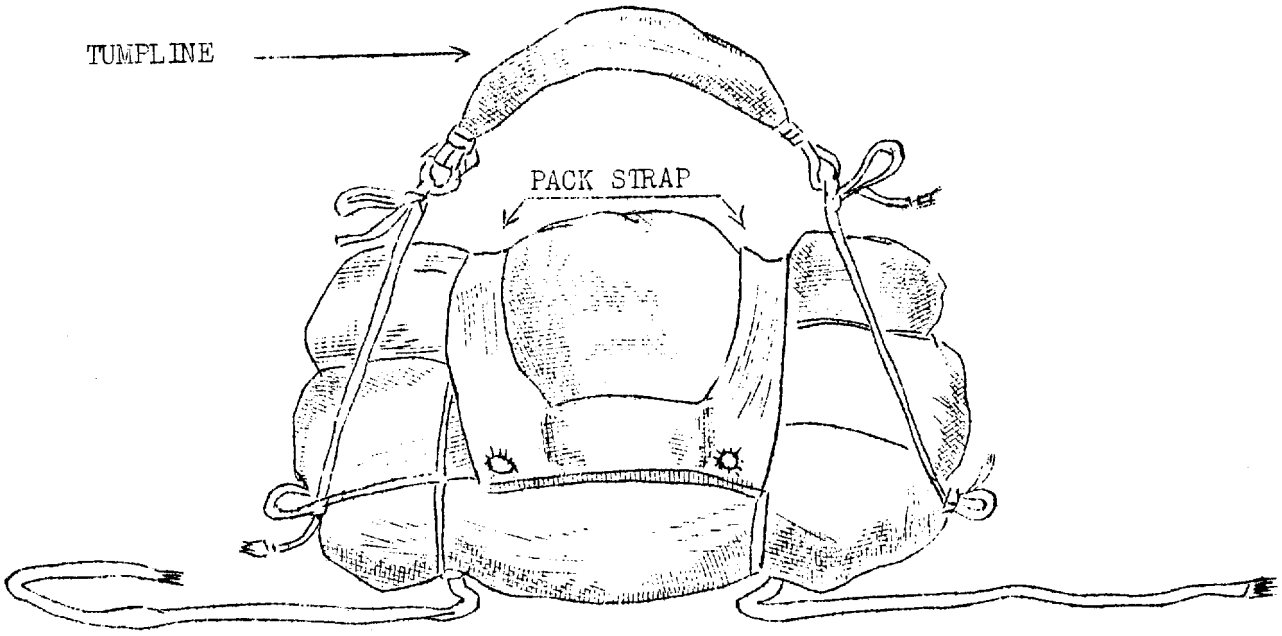


Fig 3

PACK WITH TUMPLINE AND PACK STRAP ATTACHED

It does not require sewing, for if left loose along the edge, the end knots will keep it in order: furthermore, it can be easily adjusted to fit the head. (See Figure 4.)

WEIGHT 2 OZ.

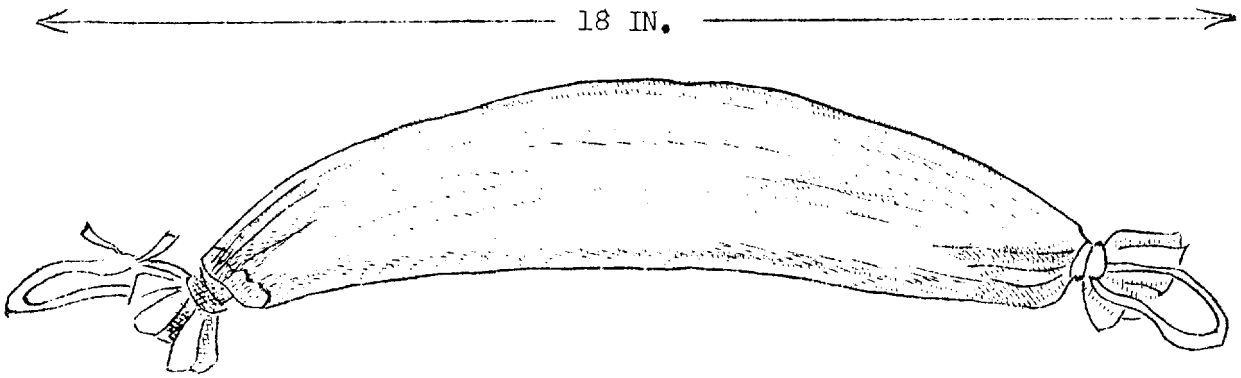


Fig 4

TUMPLINE

The loops at the ends are for adjusting the tumpline. It is difficult to reach down to the bottom of the pack and make the necessary adjustments; but when the loops are on either side of the head, they can be reached easily and adjustments can be made with little or no effort. The main strings can be constructed from raw-hide or parachute shroud lines and are tied to the lower corners of the pack, then they are carried upward to the loops at the ends of the tumpline and are tied with a slip knot. Experience will teach you to estimate the proper adjustment before you get into the pack, but a closer estimate can be made after you have adjusted your pack-straps. The proper method of using the tumpline is to have it just tight enough to transfer about one-half of the weight off the pack from the shoulders to the head. In other words, to distribute and balance the weight of the pack as much as

possible. Occasionally, a heavy pack will cut off the blood circulation of the shoulders and arms. In such cases, the tumpline is of great value, for by a slight adjustment, most of the weight can be transferred to the head and neck. Thus, the shoulder straps instantly loosen and circulation and comfort returns to the numbed arms. For a few days, the neck muscles may feel slightly sore from the unusual strain placed upon them by the tumpline, but discomfort soon disappears and, with practice, you will be able to support heavy weights on the neck alone. In Eastern and Southern Canada, the Indian canoeman uses the tumpline without a pack-strap and on portages between lakes they have been known to carry loads of 200 to 300 lbs. Stefansson records: "In the early days of the Hudson Bay Company, goods used to be made into 90 lb packages, each of which was known as a 'piece.' Some men could carry two of these. The company rule was to employ no man in portaging who could not make 80 miles in 4 days, carrying in addition to the 90 lb piece, whatever he needed in the way of food and bedding." Such packing, needless to say, would be impossible without the tumpline. The size of any type pack-sack limits the load to be carried and the leather shoulder straps are too hard and narrow for comfort in packing loads over 60 lbs. The best type of back-sack for rough wilderness travel is the "Michigan back-sack" with a tumpline attachment.

6. General Discussion on Packing Methods.

a. The Rucksack. The Rucksack is a Norwegian origin, developed for skiers. In Norway distances between villages and scattered settlements are never great, as measured in the Northern parts of Alaska and Canada. The need for carrying heavy outdoor equipment does not exist and only a small pack-sack is necessary as the weight of what a skier can carry is rather limited. Skiing,

likewise, demands a form-fitting cradle, made of cane or metal tubing, and shoulder straps only 3 inches apart at the nape of the neck. This method increases the stability required in making quick turns. These features however render the Rucksack unsuitable for survival purposes.

b. How to get to your feet with a heavy pack. The rolling method of getting to your feet with a heavy pack as advocated in some Air Force pamphlets is incorrect and dangerous. Frequently, by using this method, the balance of the pack changes, and, if snowshoes, axe, binoculars, or a rifle are attached to the load, these articles may be seriously damaged. The best method is to adjust the pack on a hill side, or in front of a tree or a strong bush, so that you can pull yourself to an erect position by grasping the branches.

c. The Pack Board. The pack board, while an excellent weight carrying rig, is not suited to plane travel or hunting, nor is it as well suited for the carrying of heavy and bulky loads.

17 April 1951

LECTURE FOR INSTRUCTORS

BASIC SURVIVAL TRAINING

NORTHERN SHELTERS

I. TITLE AND DURATION.

a. Title - NORTHERN SHELTERS.

b. Duration - One (1) academic hour.

II. OBJECTIVES.

At the conclusion of this period the student should know:

a. Types and methods of construction of Northern Shelters.

b. Materials and tools required.

III. REFERENCES.

a. Arctic Manual - Stefansson.

b. Arctic Training School Lectures and Diagrams.

IV. TRAINING AIDS.

a. Training Films - "Land and Live in the Arctic".

b. Film Strips - FS on various shelters.

c. Sectional Units and Mock-ups.

d. Diagrams - 1-A, 1-B, 3-A,B,C, 9, and 13.

V. TOOLS AND MATERIALS REQUIRED FOR NORTHERN SHELTERS.

a. Snow Cave

1. Snow axe or saw

2. Practice and patience.

b. Snow House.

1. Snow axe or saw.

2. Firm wind-pressed snow.

3. Knowledge and experience.

c. Long Fly or Lean-to.

1. Knife or axe.

2. Twenty-four panel parachute.

3. Poles, (one 20 foot pole, and eight to ten shorter poles).

4. Practice and patience.

d. Parateepee.

1. Knife or axe.

2. Poles, (1 tie-pole, 14 feet long and ten other poles).

3. Parachute.

e. Knowledge and practice.

e. One pole Parateepee.

1. Knife and axe.

2. One pole - 14 feet long.

3. Parachute.

4. Knowledge and practice.

f. Three pole Lean-to.

1. Knife or axe.

2. Poles, (one 14 foot pole and two 8 foot poles).

3. Parachute.

4. Common sense and patience.

VI. PRESENTATION.

a. Introduction: There are various types of shelters that meet survival requirements of climatic zones and seasons. This lecture covers shelters by season incorporating at the same time construction materials available at climatic zones.

b. Winter. For men living under emergency conditions, winter, as the most severe part of the year, presents various problems for making shelters under cold weather and snow conditions.

1. The Snow Cave (Mountain, Wood and Open Country). See diagram #13. The snow cave when properly constructed, along snow house principles, with a low tunnel entrance, raised sleeping platform, domed roof, and roof ventilation, constitutes a comfortable and practical shelter. Field tests, have proved that any steep snow slope is suited for this type of shelter, including perpendicular walls of crevasses. The main drawback in this type of shelter is that men become wet while shoveling out the roof of the inner chamber. The roof ventilator is made by forcing a pole through the roof. A loose fitting snow block is used for the door and this block can be manipulated so as to give as much ventilation as may be required. Building a snow cave requires little skill but is definitely more unpleasant work when compared to the construction of a snow house. It is on the whole, damper and darker than a snow house, and can only be built when snow is deeply drifted. It serves as a dead air space to hold and conserves body heat.

2. The Snow House, (Mountain, Wood, Open Country, and Sea Ice).

(a) There is no primitive shelter constructed by man, that fits its environment better than the Eskimo snow house, (igloo is

a misnomer). In shape, construction, material and comfort, the snow house fulfills requirements for shelter against cold and wind in barren surroundings. In fact, the Eskimo has taken the very elements directed against him by polar blizzards and developed an adequarte shelter. Strangely enough, the knowledge of snow house building is confined to only a part of the Eskimo population of the Dominion of Canada and is not used by the Alaskan Eskimo. There is a challenge in building a snow house, as statements have been made by writers on Arctic survival procedures, that only an Eskimo can build a snow house. Stefansson was, perhaps, the first white man who became adepted to building snow houses and who lived in them as Eskimos do. During World War II, he indoctrinated Air Force instructors and consultants, who have since in turn, indoctrinated others.

(b) Snow House Construction. It is doubtful that a man could successfully build a snow house from written instructions. However, once the principles of construction are visualized and understood through actual training practice such as the principle of the inclined plane, the most technical difficulties in the fitting of individual snow blocks is easily mastered. By a thorough study of snow house construction, (Diagram 3a,b, and c) a fairly accurate working plan will be gained, that will assist a careful novice to build a snow house. An all important point shown by the diagrams is the

emplacement of snow blocks. In this type of construction the precise practices followed in stone masonry are not required. In fact, if the impinging edge of each snow block was fitted snugly to the edge of the previous block, the former would probably fall. The important thing to remember is to have the block supported by the three impinging corners, namely the two bottom corners and the top corner resting against the previous block. The support of the three corners, aided by the downward slope of the inclined plane, is the only "mystery" in snow house building. Another important point are the gaps or crevices between the blocks. These gaps or crevices are later filled with triangular pieces of snow and the small remaining gaps or cracks are filled with soft snow, not forced, but gently rubbed in with a mittened hand. After these joints have frozen, they function as a binder and become stronger than the original snow block.

(c) Snow House Materials. Firm, wind pressed snow, is necessary in snow house construction and a beginner working with poor snow blocks will easily blame failures on himself. In reality, failures may be caused by utilizing poor materials. Once skill is developed, a successful snow house can be built, even from poor quality snow. A good snow block should be about 18 to 20 inches high, 30 to 36 inches long, and four (4) to six (6) inches thick. (The first two (2) tiers should be six (6) inches thick, while the upper tiers four (4) inches thick).

Blocks can be cut horizontally or vertically if snow is deep enough. The vertical cut is useful, because some of the blocks can be cut from the snow house site, specifically from the area that later will be used as the wall from which the door leads to the outside. One builder working from the inside can lay blocks as fast as a two (2) man team can cut them. A trained team of three (3) men under ordinary conditions, can build a snow house in 45 minutes.

(d) During World War II, instructors were called upon to demonstrate snow house building, under poor snow conditions. This resulted in the development of a technique that porduced good snow house building from bad snow. This was accomplished by pressing down soft deep snow by walking on it with snow shoes. However, care must be taken to press snow evenly, otherwise, soft unpressed spots will remain in the block.

(e) After allowing this prepared surface to freeze overnight, it can be cut into good snow blocks on the following morning. In forested areas, where there is little wind, snow rarely becomes firm until it has settled from the warmth of the approaching spring. The weight of a man on snow shoes can accomplish what the wind normally does in the open, wind-swept country. By this method, building and use of the snow house can be accomplished in a short period of time. The prepared surface must not be filled with brush or willows, because it would be impossible to cut snow blocks under such conditions. It is obvious

that this method can not be used under steady travelling conditions, as snow required several hours to harden.

(f) A well known antarctic explorer stated recently that snow houses were not used in the South Pole expeditions, because it took too long to construct them. Inquiries proved that the time taken to erect tents, employed by the expedition, was equal to the time required to erect a snow house. Under severe weather conditions, such as strong winds, etc., the time required to erect a tent was even longer. Opposition to the use of the snow house is usually based upon a lack of knowledge and frequently stems from a defeatist attitude.

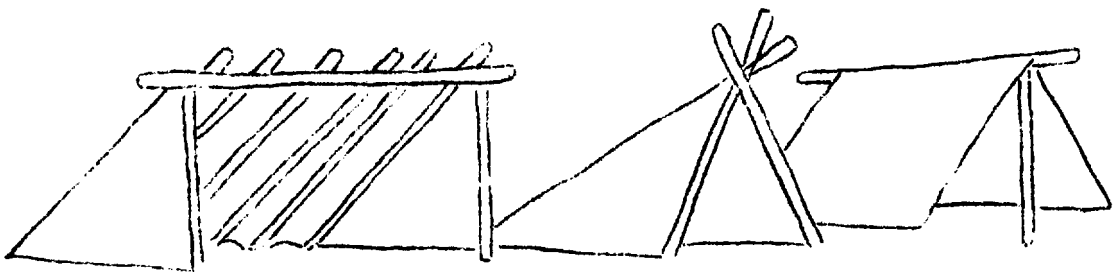
c. Winter - Summer.

1. Lean-to's, Diagram #12, "The four (4) Best Outdoor Shelters". The lean-to is the simplest of all outdoor shelters and the easiest to construct. Fabric of sufficient size to cover the occupant, rope or string, poles from green or dry wood are the only materials required. The frame of a satisfactory lean-to can be constructed from dead poles with or without using an axe, provided sharp limbs are knocked off and the pole is smoothed down with a knife, flat stone, or any hard or metal instrument. Smoothing the pole surface is required so th t the fabric used as a cover will not be town. The success or failure of the lean-to depends on building an adequate fire to spread warmth equally throughout the shelter and the proper placing of the lean-to and fire in relation to the prevailing wind. Reference to wind direction in relation to outdoor shelters frequently prompts the question; "How do you know which way the prevailing wind blows"? The answer is, that men living in the open

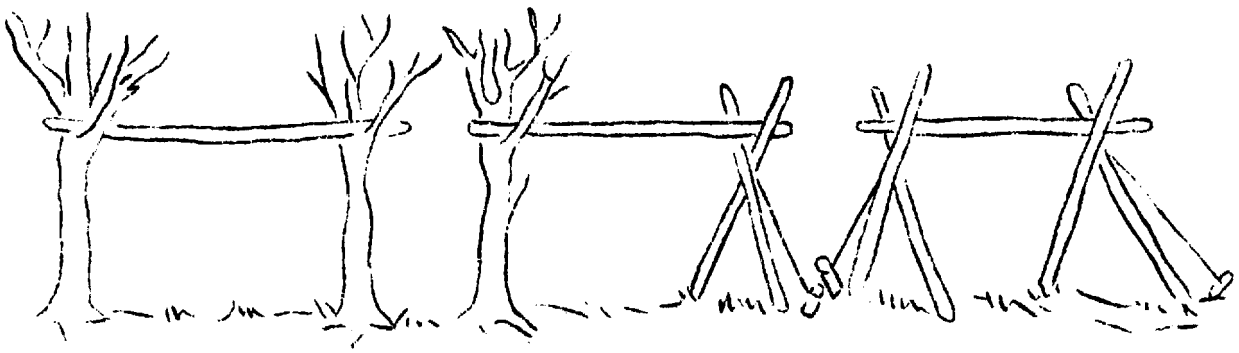
must learn at the earliest possible moment, the directions of the prevailing winds. As an example, on the eastern side of the Northern Rockies, the prevailing wind is the "West" or "chinook" wind. This wind, however, may shift and blow from the south for several days or a week. The "North" or "Hudson Bay" wind, is known as a storm wind, bringing snow or rain and usually lasting only a day or two. In various regions where winds are usually influenced by natural configurations, such as mountains, they follow, valleys between mountain ranges, and blow out onto the flatlands. By studying winds over a period of days, a fairly accurate forecast may be made as to whether a wind will continue to blow from a certain direction during the night. Fair weather winds usually decrease at night. Glacier winds, likewise usually cease at night fall. In deep mountain valleys, the wind usually moves downward at night and upward in the morning after sunrise. Therefore, the opening of the lean-to or the door of a teepee should generally face directly across a valley to be situated at right angles to the prevailing wind. Such positions would insure the prevailing wind blowing fire smoke away from a lean-to and will provide the best draft for teepee fires. Never forget that close observation of wind directions is of the utmost importance in amny other respects. These will be dealt with in other courses, such as hunting, stalking, travel, establishing a camp, etc.

2. <u>The Long Fly, Lean-to.</u> (Diagrams, Fig. 2). Building a Long-Fly, 12 to 16 feet ong, depends on the size or amount of fabric available. A 24 panel parachute will build a complete 14 panel parateepee and a ten panel Long-Fly, which are capable of comfortably sheltering 10 men, (3 in the parateepee and 7 men in the Lean-to). Aircraft wing covers are excellent Lean-to's used in the manner described. However, their use is not stressed, as covers

may not be carried on a plane. Heavy paulin, such as engine covers are likewise omitted, as their weight would negate same from inclusion in the equipment of a traveling party. In areas where men could remain safely beside their aircraft, such materials and many other items would, of course, be of value in camp making. The pole structure of the fly is simple. A single large main pole and other poles are emplaced on one side at short intervals in order to support a fabric cover in such manner that it will shed rain or snow, while possessing sufficient strength to withstand average wind pressures. There are three popular methods of pitching a fly: Fig. 1, the Long-Fly, Fig. 2, the three pole fly, and Fig. 3, the shade fly.



The support for the ridge-pole may consist of: Fig. A, two trees, Fig. B, one tree and scissor made by two crossed poles, or Fig. C, where trees are not available, a pair of scissors.



The ridge-pole must always be tied firmly to trees, or when tow scissors are used, firmly staked, or tied to rocks or stumps. The next step is to lay the required number of poles against the ridge-pole. Standing dead poles, (when not rotted) are usually easier to smooth down than green poles are. These poles may be thin, (as is frequently the case with spruce or pine that grow in thick "stands") but they must be sonnd and long enough to insure at least seven feet of sleeping space, which usually required poles at least 11 feet long. Poles should be laid parallel against the ridge pole and about 18 inches apart. When emplacing the fabric cover, commence by stretching same firmly along the ridge-pole and tie the fabric with string or rope to the ridge-pole and roof poles as well. Then attach the bottom of the fabric to the base of the roof poles. If sufficient fabric is available, pull the bottom corners forward and stake firmly to build a windbreak. The "Long Fire" method as illustrated

and described in article, "Outdoor Fires", is recommended with the Lean-to shelter, particularly in cold weather.

d. Spring - Summer - Fall. (Timbered or Open Country)

1. The Parateepee. (See Fig. I and II, "Parateepee".)

(a) The teepee of the buffalo hunting western plains Indians is comparable in shelter requirement with the snow house of the Arctic barren land Indians. Both of these houses -- (neither should be classed as ordinary shelters) -- are examples of the ability of primitive man to survive. Many white men have tried to improve on their structural details without success. The teepee, in primitive times, was a crude affair. Remains of these ancient abodes can still be found in the Northern Rockies, for they consisted of deep circular pits, surrounded with dirt walls and covered with a crude roof of animal skins. The western plains Indians, who migrated from place to place following the buffalo herds used a very small teepee with poles light enough to tie to a dog's back, which, with the ends dragging on the ground, evolved into the "travois". When the Spaniards arrived in this country, the Indians were trained to employ horses as pack animals. This enabled them to carry heavy buffalo skins from place to place. The use of these heavy construction materials resulted in larger and more elaborate shelters. In a matter of a few years the small original skin shelter, hidden away in some thicket, evolved into the Indian lodge in which whole families

could live in comfort and dignity.

(b) Pitching the Parateepee.

(1) Poles. Poles required for a parateepee should be fourteen feet long, as the length of a panel of a parachute, along the seam is about 12½ feet. The fabric is tied to a separate pole known as the "Tie-pole". This pole with the fabric attached is the last pole to be placed in position (when the circle of poles is completed) and its position should be directly opposite the door or entrance with an equal number of poles on each side of it to complete the circle. (See Diagram #2b). Parateepee poles should be smooth and slender. Eleven poles are required for the parateepee frame work, namely, 1 tie-pole, 3 tripod poles, 5 loose poles, and 2 wing-poles. In the event materials are not in sufficient quantity, nine poles will make a satisfactory set.

(2) Cover. Spread the parachute or other fabric cover on the ground, and cut off all shroud lines around the oter edge (about sixteen inches from the edge of the fabric); then tie ends into two and one half inch Bowline loops, as close to the fabric as possible. These constitute tent-peg loops. Tie small end of parachute to tree or have another man hold it. Locate panel marked 1, and with a sharp knife, separate panel 1 from panel 24 by cutting along the hem on the 24 panel side,

of the hem of the 15th panel. Locate the hem between panels 6 and 7, follow it to the central aperture of chute and cut off the shroud line at the opposite end, so that its full length remains as a part of the hem referred to above. This short length of shroud line is used to lash the top of the parateepee to the tie-pole. Then cut off short, all the short shroud lines between panels 1 to 14. The parachute is now divided into two parts of 14 to 10 panels respectively. The 10 panel piece is an extra that can be used in many ways. Its uses are described in other articles such as; "Emergency Clothing", "Fishing" and "Snares". So roll it up and lay it aside. The 14 panel section is now a Parateepee and final completion consists of swwing on two wing-pole loops and three pairs of tie strings at 1 foot intervals above the door. The wing-pole loops and tie strings can, if speed is necessary, be tied on with clove hitches and swwed on later.

(3) Erecting. Locate a level circle of ground about 16 feet in diameter. Assemble poles which have been smoothed with a knife or axe. Select one of the straight, heavier poles for a tie-pole. Lay the heavier pole on the ground, slip the loop at the bottom of the hem, between panel 6 and 7 over the butt and, tie the shroud line at the upper end of this hem to the top of the tie-pole. Stretch the hem firmly. Choose three of the heavier,

straight poles for a tripod and lay them side by side, parallel, to the tiepole with all four butts even. Return to the top of the poles and lash the three poles poles at a point directly opposite the top lashing on the tie-pole. Tie the tripod poles separately with clove hitches and wrap the loose ends around the outside, then tie with a square knot. Raise the tripod to a vertical position and spread the butts until the teepee will stand without further support. Move butts outward to form a solid base. The entrance may be utilized as a door frame. The entrance, however, must face across the path of the prevailing wind, as described in the construction of Lean-to's. The fine loose poles, (required in the construction of an eleven pole pitch) are now placed at regular intervals, so that their butts, including those of the tripod poles form a circle of about 10 feet in diameter, with a space directly opposite the entrance for the tie-pole. The tie-pole, with the Parateepee attached, is now placed in position and the two side of the fabric cover are carried around the outside of the pole framework and tied with the tie-strings in the center of the entrance. Panels 13 to 14 should remain loose to form the folding entrance. Stretching the fabric cover is now in order. This is done by entering the parateepee and moving the butts of the poles outward

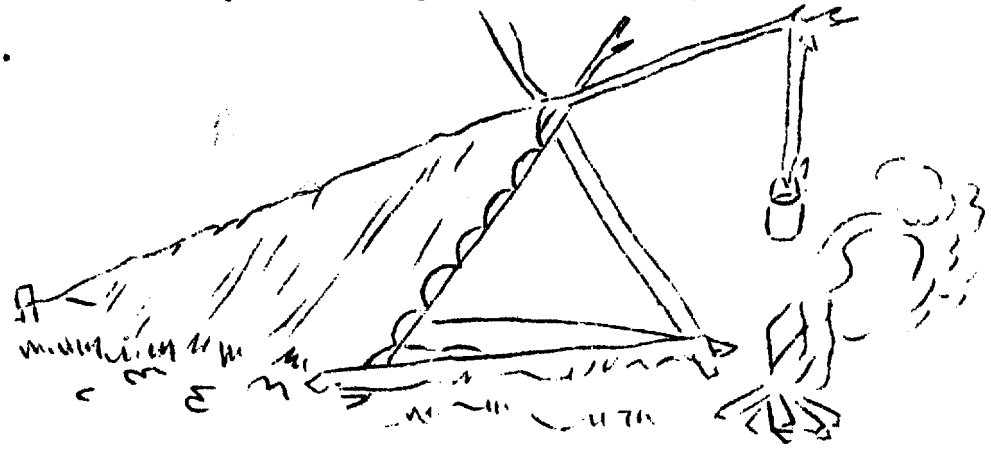
to form a larger and more perfect circle. The poles should be moved outward evenly, until the fabric is tight and smooth. The correct diameter of the circle should be judged by watching the bottom wall of the Parateepee, formed by the fabric cover, and this should be several inches above the surface of the ground. Commence pegging on each side of the tie-pole. Place pegs through the peg-loops, twist several times, pull the bottom of the fabric cover firmly and away from the tie-pole and drive the peg into the ground. Two men can work one man on each side, drawing the bottom of the fabric forward and downward in order to attain a smooth, tight surface. If the parateepee is built by one man only, he should peg alternately on each side. Butts of poles should then be pulled firmly outward, until they contact the fabric. When properly pegged, the fabric should be smooth and tight and capable of resisting wind and shedding rain and snow. The final step consists of inserting the ends of wing-poles into the wing-pole loops and pushing the butts forward until the upper front of the parateepee is flat and taut, forming a surface on each side of the smoke hole and insuring good draft induction for fires. The indoor arrangement for sleeping and cooking are shown in (diagram 2c). A parachute shroud line is stretched around the poles about five and one half feet above the

an important fact in lighting para-teepee fires is that unsplit wood throws less sparks than split wood. If grass or the ground cover begins to burn around a new parateepee fire, allow it to burn for a little distance before putting it out, as there will then be less chance of accidental fire later. Parateepee fires should not be built in a hole, which destroys the draft, nor on a platform of earth or stones, which adds to the fire hazzard and keeps the fire heat from reaching the feet and lower limbs of the occupants. Stones around a teepee fire can be dangerous as river rocks sometime explode when subjected to heat.

g. One Pole Parateepee, (Emergency). When there is an immediate requirement for shelter, a parateepee can be pitched with one pole. To accomplish this, however, a large tree with wide spreading limbs is necessary. The fabric cover is tied to a pole in the same manner in which it is tied to the tie-pole. The pole is then raised and leaned in such a manner that the upper end is firmly fixed in a crotch of a stroung branch, (diagram #2c). The front tie-strings are then fastened and the loose fabric is stretched into a circle and pegged to the ground. A little more care is required against fire accidents, because the parateepee walls lean in more than when a pole frame is used. Poles for a strong set should be secured as soon as possible.

h. The Three Pole Lean-to, (Emergency). See Fog. (D). Four complete panels of parachute fabric can be quickly made into a three pole shelter which in emergencies will provide a satisfactory refuge for the night. The poles necessary for this type of shelter are: Two 8 foot poles, for the scissors and a long pole to tie the fabric cover to. Following the same prodedures employed in the construction of the parateepee tie-pole, a three pole lean-to may be

erected. In this case however, the small end of the fabric cover is placed on the grounded end of thepole and the outer edge of the chute is tied on the point where the pole rests on the scissors. Two logs are then laid on top of the loose fabric in such a position that they form a V. These logs hold the sides of the shelter to the ground and serve as tent pegs, a short log laid between the butts of the scissor poles form a retaining wall for the bough bed. The outer edge of the fabric cover is laced to the scissor poles. The entrance is positioned across the path of the prevailing winds. In the advent of snow, or rain an entrance flap can be suspended over the opening by use of any extra fabric.



(D)

i. Wind Breaks. It is not advisable to camp on the lee side of a hill in open country where deep snow drifts form. The lee of large thickets or tree stands are safe locations and provide an ideal location for the construction of a wind break, as snow has usually settled before penetrating deeply into a thicket, grove, or stand of trees. A low snow block wall may be built in open country with the windward side strengthened with ice formed by throwing water on it. The wall of snow blocks should not be more than 4 feet from the tent

and be circular in shape.

j. Slab Lean-to, (Timbered Country - Winter and Summer). (See diagram 13, Fig. #3, "The Four Best Shelters".) In almost all parts of the northwest, a "slab shelter" is frequently employed by hunters forced to spend a night in the open in stormy weather. Fallen tree trunks that have been subjected to dampness, have rotted centers and become punky before the outside or casing has lost its hardness. Such logs can be kicked apart with a stout shoe, or, split into slabs with an axe or hatchet. These slabs are curved along their length and can be formed into waterproof walls and roof by laying same against a ridge pole supported by the lower limbs of two trees. The method of laying the slabs is similar to that used in laying curved tile roof. Knot holes can be covered with smaller log slabs. This shelter is valuable because.

1. It can be constructed without an axe.

2. It is wind and waterproof.

3. When wood log slabs in proper condition are found, it can be constructed very quickly.

4. The long fire can be employed with this type Lean-to.

k. Other shelter made of boughs which are so frequently illustrated in sporting magazines, are the poorest of al outdoor shelters. Boughs do not reflect the ehat of a fire and are not windproof. In a rainstorm, these shelters become very wet, and, if a fire is started after a snowfall by night the snow will drip straight through the roof. Sitting under a tree is better under such conditions.

VII. CONCLUSIONS:

a. The most important thing to remember in construction wilderness shelters is the advisability of making camp early enough to do a good job. The moment you realize that you must spend the night in the open, begin to look for a satis-

campsight. Man frequently keep on going until overtaken by darkness. Poor materials, workmanship, and haste result in spending a miserable night. It is far better to start shelter construction an hour earlier, when good building materials can be located and selected, rather than to push on in the hope that a good location with adequate building materials will be found further on. Practically all good types of wilderness shelters require considerable time for their construction. The preparation of shelters for protection from storm, wind and cold, wherein men can cook meals, dry clothing, and find warmth and relaxation, should not be measured in terms of time. They are essential to a survivor.

b. Safe and rapid travel requires the alertness provided for by restful sleep. An extra 15 or 20 minutes given to assembling the requisitts for warmth and comfort will pay high returns in strength building sleep.

1 MARCH 1950

LECTURE FOR INSTRUCTORS

BASIC SURVIVAL TRAINING

I TITLE AND DURATION — COURSE B2E-7d

a. Title. COLD WEATHER CLOTHING.

b. Duration. One (1) academic hour.

II OBJECTIVES

At the conclusion of this period the student should know:

a. The essential characteristics of cold weather clothing.

b. The types of clothing best suited for keeping warm in extreme cold.

c. Proper wear and care of cold weather clothing.

d. How to dry clothing by an open fire.

e. How to repair and improvise emergency clothing.

III REFERENCES

a. Arctic Manual - V. Stefansson.

b. Arctic Training School Diagrams and Lectures.

IV TRAINING AIDS

a. Current issues of Arctic Clothing.

b. Articles of improvised clothing.

V PRESENTATION

1. Introduction. The first problem facing crews forced to crash land in the Arctic is adaption to the extreme cold, icy winds, and the conservation of body heat. Your body is the only heat plant that you are sure to have with you in such an emergency. Knowing how to conserve your body heat may well mean the difference between freezing and keeping warm. There are three ways to conserve body heat:

a. By proper wear and care of clothing.

a. By becoming accustomed to keeping your body dry.

c. By reducing body activity to a minimum in order to avoid sweating.

To try to evaluate each type of cold weather clothing would be an almost endless task. These types of clothing are too numerous and are undergoing continuous modification through research and development, to be covered in this discussion. The purpose of this lecture therefore is to identify and recognize desirable and essential characteristics of cold weather clothing. But, we must also consider and master the proper care of clothing and how it should be cared for in order to obtain maximum efficiency.

2. Characteristics of cold weather clothing. First, let us consider some of the qualities necessary in the fabrics from which clothing is to be made. All fabrics may be classified according to their conductibility.

a. Those which readily conduct heat are known as good conductors and are generally dense or heavy, and

b. Those which do not readily conduct heat are known as good insulators and usually consist of a mass of tiny air cells separating

the fibers. Still dry air is one of the best known insulators. The clothing we wear merely insulates the body from the outside cold, it is therefore essential that cold weather clothing have good insulator qualities. Since pressing together the molecules of an otherwise good insulator makes it a good conductor, it is also essential that cold weather clothing possess a high degree of non-compressibility. In other words, cold weather clothing must be resilient. It must resume its original shape after compression in much the same way as a sponge rubber ball resumes its original shape if any pressure which has been applied is released. In addition to being a good insulator and resilient, cold weather clothing must be easy to dry. This property has not yet been satisfactorily attained, except by the Eskimo.

3. Evaluation of clothing materials.

a. A fabric or fur composed of thousands of tiny, rigid cells of still dry air is the best known non-conductor of heat yet found. No fabric or fur has been discovered that can equal that of the mid-winter coat of an adult reindeer or caribou. Each hair contains tiny cells of still dry air, in the same manner that the trunk of the bamboo tree does only on a far greater scale. The walls of these cells are practically rigid, and, relatively dry air, is held in the areas between the hairs, which the wind, can disturb or separate. But these hairs, when flattened by wind, form a flattened outer surface, which merely adds wind-resistant properties. The Eskimo found these properties long ago. The Eskimo wears his inside fur garment with the hair side turned in. His outer garment is worn with the hair side out to prevent the wind from reaching the two

leather surfaces. No cold weather clothing has ever been invented by white man to compare in efficiency and lightness to the old Eskimo caribou assembly. (These findings however do not include the development of new "Nylon Fur" recently invented, and which to date has not been thoroughly tested or produced in quantity. Unfortunately shortages of supply and the constant care this type of clothing requires precludes military use.

b. Woolen garments. Woolen fibers themselves, contain no air cells, but when woven into fabrics are extremely resilient and are capable of holding a large amount of dry air comparatively still between the fibers. The wool itself possesses another characteristic of great value in survival. Natural hair oils, identified commercially as lanolin, prevent absorption of moisture. Virgin wool garments, from which lanolin has not been removed by processing, are easily dried out. This is a principle reason why a man in virgin woolen underwear may well live after immersion, while he would have frozen in cotton "sweat" shirt and trousers. Cotton fibers soak up water considerably faster than woolen fibers and are in theory, that more difficult to dry.

c. Skin garments. Garments made from the skins of birds possessing heavy down next to their skins, (such as ducks, geese, and loons) are excellent insulators. Such garments have one great drawback, they are almost impossible to dry out in freezing temperatures.

d. Pile fabrics. In an effort to develop a fabric approaching the characteristics of reindeer fur, which would be available in sufficient quantity for military use, the hairs of the South American alpaca and sheep wool were woven into fur-like fabrics and identified as alpaca pile and mouton. These fabrics are fairly satisfactory, being relatively

resilient and holding appreciable quantities of still air. The short haired fabrics are fairly easy to dry and recover their resiliency to a good degree. Alpaca pile is easier to dry than mouton, but mouton, because of its finer, thicker mass of hair per square inch, is warmer.

e. Summary. While no materials, except those employed in making Eskimo clothing, are superior to those types of fabrics we have just discussed, it should be stated that any fur, feathers, or fabric, have certain values during arctic emergencies.

4. Methods of Dressing.

a. Regardless of the individual items of clothing that may be worn, dressing for cold weather usually follows one of two methods. The first method results in several layers of clothing, while the second is made up of a single or two-piece garment.

b. The layer assembly. The layer assembly follows the old Eskimo custom of dressing and possesses a number of distinct advantages. It is adjustable, which means that as activity varies, clothing may be put on or taken off as required. It is a good insulator since air is trapped between the layers as well as within the layers, and compression can easily be corrected. In the event of immersion, only those garments which are wet need be removed. In addition to the above each garment is made from comparatively thin material and dries easily. The disadvantages stem from the fact that there are more garments in a layer assembly resulting in more work required for the care of same.

c. Single or two-piece assembly. The single or two-piece method of dressing was a wartime development in the field of arctic

clothing. It consists either in the form of a single heavy coverall type garment or as heavy trousers and a heavy jacket. There are two advantages to this type of clothing. It can be donned quickly and is easy to care for as long as it is dry. On the other hand, such clothing is non-adjustable and is difficult, if not impossible to dry under survival conditions. Furthermore, the bulk of these garments retards movement and a one piece garment must be dropped completely in order to defecate, or dry.

d. Comparison of the two methods. A comparison of the two above methods of dress will lead to one conclusion; namely that the layer method of dressing is preferable in cases where extended periods of time are anticipated or physical exertion is involved. Breaking down the layer method a little further leads us to consideration of garment liners. Garments with liners sewn in should be avoided, and this applies also to gloves, mittens, jackets, parkas, trousers, etc. Removable liners are easy to dry and can be removed when not needed.

5. Types of clothing.

a. Parkas. No polar wardrobe is complete without a parka. This classic garment comes in either pullover or overcoat style and hangs down to the hips or even lower. All parkas have hoods which are usually trimmed with dog, wolf, or wolverine fur. The wolverine fur is by far the best, as frost or ice does not stick to it. Most survival pamphlets recommend that the face be covered (underneath the parka hood), with parachute fabric or other soft material to keep the face warm. But this suggestion totally disregards the fact that, properly fitted and worn, the parka hood is designed to accomplish this very result without

the aid of extra material. To begin with, not more than one out of ten hoods used by Air Force personnel during the last war, actually fitted the wearer. The neck length, shape of the head, amount of hair, and the type of hat worn by the individual plays an important bearing in the fitting of a parka hood. Men lacking a heavy head of hair should wear knit wool caps or pile line caps inside their parka hood. In every instance a man should make sure that his parka hood is properly adjusted to the type of headgear he intends to use when a blizzard is blowing. If the hood is loose and will not stay in proper position, a four inch piece of elastic tape cut from an old garter and sewed in proper position on the back of the hood will hold it in the position desired. Under certain conditions, i.e., a forty mile head wind and sub-zero temperatures, extra facial protection might be needed, but in any and every instance proper fitting of the hood is necessary. The parka may have drawstrings at the neck, wrists, and waist. It may consist of two layers or shells, with wool inside and windproof fabric outside, or it may consist of two layers which are separate garments held together by buttons, snaps, or a zipper. Of all types of fasteners, the zipper is the least dependable and for steady travel the unlined parka is the best.

b. Head protection. For head protection, any type of standard issue headgear will prove satisfactory. Even a cap fashioned from the knitted container of the A-14 mukluk assembly is very satisfactory. The parka hood is primarily designed for head protection against the cold, extending past the face so that it may be pulled forward on the windward side. Face masks provide excellent protection for various conditions as,

for example, protection against the prop wash or for short periods of exposure under extreme low temperatures. Over a long period of time, however, all face masks ice up, and endanger the face.

c. Hand protection, (gloves and mittens). Hand protection presents a real problem. You must keep your hands warm and at the same time you must be able to make fine adjustments while working with various tools and do other work involving nimble use of fingers. Bearing this in mind, wear as many pairs of gloves and mittens in graduated sizes, as may be necessary for adequate protection, with a wool or rayon insert next to the skin so the hand may be pulled out and used for short periods required for fine work. If hands become cold while traveling, flex fingers rapidly until warm or place them under your clothing, under your armpits, or crotch, until circulation is restored.

d. Footgear. Winter footgear must be large enough to hold two to five pairs of woolen socks, thick insole liners and your feet. In fact footgear should be selected, so that with all pairs of socks on you should have a little room left over. If your feet are covered with materials which are comfortable yet springy enough to hold thin layers of dead air, your feet will be warm even when temperatures drop out of sight. However, do not expect that socks with holes in them, or dirty socks will keep your toes and heels warm. Shoepacs are fine in wet snow or in temperatures as low as zero, but mukluks or felt boots are far more desirable when temperatures range below zero and snow is dry. If shoepacs are correctly worn by an experienced man, these would be safe even in sub-zero cold. Never wear blucher type boots, as well-tanned

leather provides very poor or no insulation. Air Force personnel frequently express a dislike for the shoepac. For rough year around northern wear, no shoe is superior to the shoepac and a few words on this item are believed necessary. Shoepacs worn by Alaskans, in the "old days" were of the same general design as the Air Force shoepac of today, but with certain important differences:

(1) They fitted the foot.

(2) They were light.

(3) They were sufficiently pliable to possess considerable cold-resistant properties and allowed ample foot movement.

A special effort was made during world war II to duplicate these desirable qualities in an Air Force shoepac with minor improvements. One improvement was incorporated but this changed the design of the shoepac and as a result it became clumsy, illfitting, and excessively heavy. With mukluks wear several pairs of socks. Many airmen have found that the five-pair polar sock assembly is satisfactory. The five-pair polar sock assembly consists of (1) a lightweight woolen sock next to the foot, drawn up over the winter underwear, (2) three additional woolen socks, of which at least two should be heavy, a felt sock, an insole and then, the mukluk itself. The trouser leg should be bloused over the mukluk to keep out the snow.

e. Shirts and trousers. Wool shirts and trousers should be worn over a two-piece woolen underwear, in order to complete the requirement for layer system dressing. As many pairs of trousers and

shirts may be worn as conditions necessitate. Additional clothing may be put on or removed as weather conditions require.

6. Proper wear and care of cold weather clothing.

a. Under winter survival conditions your clothing is your primary and most necessary shelter. It constitutes the only first line defense against cold and wind. The insulating qualities of various fabrics employed for your clothes depend largely on the treatment received. The most common of all causes resulting in the loss of insulating qualities of fabrics are dirt, vehicle oil, grease, and moisture. A survey of rescue reports provides evidence of serious neglect in the care and wear of clothing, resulting in either relatively minor discomfort to death through this negligence. The Boy Scout motto, "Be Prepared" cannot be over-emphasized here. Dress for terrain and existing weather conditions on the ground and do not rely on the comfort of the aircraft heater.

b. Keep your clothing dry. The first cardinal rule of survival at any time is to keep dry. Water conducts heat away from the body about twenty times as fast as dry still air. Therefore, brush frost and snow off your clothing frequently, especially when entering houses or shelters and when standing near a fire of any sort. Perspiration should be avoided, wet underclothing is deadly in Polar Regions during the winter. If, during exertion, you begin to sweat or get too warm, loosen your clothing for ventilation, take off some of your clothing or slow your exercise to a point where you do not perspire. Even throwing back the Parka hood and removing gloves will quickly reduce excessive perspiration. Other important factors which aid in keeping clothing dry are;

(1) Preventing infiltration of snow at such points as the neck, sleeves, waist, and feet.

(2) Preventing accumulation of moisture on outer garments by constantly brushing same off.

(3) Leaving heavily frosted or iced garments outside when entering a shelter, and removing frost or ice at the first opportunity.

(4) Paying particular attention to parka ruffs, mittens, footgear, and snow-catching wrinkles in outer garments.

It is more important to keep footgear dry than any other part of your clothing. It is very important that you change socks every six to eight hours, as perspiration destroys insulating qualities. Damp socks or mittens will dry out to a considerable extent if tied to the pack, dog-sled, etc., in still weather, allowed to dry while traveling.

c. Heat loss from compression. Another important survival rule is the prevention of heat loss resulting from compression. Compression reduces the thickness of materials and, the volume of contained insulating air. Where unavoidable compression occurs, insulation must be deepest. The areas requiring extra insulation are spaces between the shoe sole and the foot. When using the sleeping bag, it is especially important that at the point where contact with the shoulders, buttocks, and feet is made that extra insulation be provided. Avoid compression from bulky and exceedingly heavy clothing. Tight gloves and footgear are especially dangerous and should be avoided.

d. Keep your clothing clean. Greasy and dirty spots allow heat leakage, as such spots clog up the pores of your clothing. Dirty spots develop a crust and become solid, and therefore are good conductors of cold. Furthermore, cloth fibers of such spots wear out very quickly.

e. Wear proper fitting clothing. Fitting of your clothing is an item of great importance. Make sure that the fit of your clothing is such, that adequate dead air insulation is provided. Clothing that is too tight should not be accepted as proper insulation and blood circulation will be restricted. The best fitting garments are those that allow about one-fourth inch of dead air space between each layer. For most clothing, an outer garment should be approximately three inches greater in circumference than the garment underneath. Air Force clothing is designed to provide this extra circumference. Thus, a size 40 overgarment is approximately three inches larger in circumference than a size 40 under-garment. Be particularly careful in judging the fit around the joints, shoulders, elbows, hips, and knees. If your clothes are too tight in these places, pressures resulting from body movements will squeeze out valuable insulating air and restrict blood circulation sufficiently to allow freezing. On the other hand, remember that if clothing is too loose, heat will leak out in the same fashion that a hose leaks water. The places from which you are most likely to lose heat are at the neck, wrist, waist, and ankles, so to avoid heat loss, wear around your neck a woolen or silk scarf and tighten the Parka drawstring to stop this leakage. For your wrists, knitted wristlets under your sleeves and gloves will help, and for your ankles, enough socks and properly worn pants will do the job. You can

protect your waist by using a drawstring, or a belt, depending on the type of Parka worn. Make sure that there are no buttons missing on your underwear and that your fly opens and closes easily. Arctic cold and wind chill constitute the greatest menace in arctic survival. A wind of only ten miles per hour at -40°F can freeze exposed human tissue in one minute. Therefore, outer garments should by necessity be windproof, to help eliminate this wind chilling.

7. Methods of drying clothing. Drying clothes that have become wet, either through negligence or accident, presents a real problem in survival. With a little time and patience, however, this can be overcome in several ways.

a. Stoves. Clothing may be dried by the use of a stove in a shelter. Clothing should be suspended as closely as possible and near the top where air is warmest. Stoves should not be lighted solely for drying clothing, but clothing should be dried when use of stove is made for cooking in order to conserve and provide maximum utilization of limited fuel supplies.

b. Freezing, wet, or damp clothing. Heavy outer garments or sleeping bags may be dried by placing some outside and allowing these to freeze. After they have frozen, most of the frost and ice crystals may be knocked off with a stick.

c. Primitive methods of drying clothing.

(1) Up to this point, the problem in the care of cold weather clothing has been confined to survival under civilized or Eskimo housing conditions. We must now

place special emphasis on the care of clothing if surviving under primitive conditions. It may be a surprise to all of us that the Polar Sea and North Pole are less severe in temperature than sub-Arctic regions. The one exception from this is, that severest temperatures occur in areas where there is forest growth. Forest growth usually changes the entire outdoor procedure, namely the dependence on James Huts, Primus stoves, and Eskimo techniques. The problem then becomes one of open fires, with which we are all familiar, either from outdoor books or movies, if not from actual experience. There is danger in the use of open air wood fires, as these flare up and their flames move back and forth following the wind. Experience in the proper use of fires and drying techniques in order to do a safe job of drying will eliminate accidents. Alaskan Sourdoughs have a saying that "You can tell a Chechalko by his burnt boots," but there should be a grim warning added to the saying, namely, "A burnt boot can cost a man his life."

(2) Drying methods. Warning against dangerous procedures. Before taking up this matter, we should review information published during World War II. Diagrams furnished to Air Force personnel, showed shoes resting upside down on stakes driven into the snow beside a cheerful fire. A framework of sticks was illustrated with a lashed

crosspiece to support the sleeves of a coat, which stood beside a fire in the form of a sail, so that the first change in wind, or thawing of the snow caused by the heat of the fire, would drop the coat on top of the flames. Socks and other vital items of clothing were likewise treated by similarly dangerous methods. It is therefore necessary to warn inexperienced trainees against such practices, should they encounter them in old lectures, TC's or diagrams.

(3) Safety First, (drying over open fires). There are several rules that MUST be followed for the successful and efficient drying of clothing beside an open fire.

(a) Clothing should always be suspended in such a manner that, if it should fall to the ground during periods when it cannot be watched, it WILL NOT fall on the fire.

(b) It must be dried slowly. Exposure of any fabrics to excessive heat, will singe and destroy the surface threads resulting in that the fabrics will lose water and wind repelling features and will disintegrate rapidly.

(c) It must not be hung so low that men moving about in the dark, will bump into and dislodge drying clothes. The best method (with an outdoor fire) is by stretching a rope, string, or parachute

shroud, between trees or poles, at a height of 6 feet or more, and to one side of and above the fire.

(4) Boots must be unlaced to the last hole and the lacings tied securely together. Suspend boots with the soles down, on each side of the drying rope. The heat of the fire applied to the soles, warms the inside air, which rises to the open top of the boot and evaporates outside. Time can be saved in drying rubber or leather shoe gear by first wiping the inside of the wet boot with porous cloth, dry moss, or grass. Inner soles and socks should be pinned together with a safety pin not less than 3 inches long and hung across the drying rope. Gloves should be pinned or tied together and hung in the same manner. Alaskan Sourdoughs always have safety pins pinned inside their pockets for this purpose. In the case of socks, moisture will condense on the inside and they should be turned inside out at frequent intervals to hasten the drying process. The safest and the best way to dry a shirt, parka, or coat is to untie one end of the drying rope, pass it through both sleeves, and re-tie it in its former position. Trousers should be safely tied to the drying rope with the dampest part closest to the fire. Whenever clothes are drying, great care should be taken in piling on more wood, lest sparks or flames reach the clothing. If

this method of drying is followed, chances of accidental burning will be reduced to a minimum.

(5) When either the parateepee or the fabric lean-to is used under primitive conditions with an open fire, it will be found that both of these shelters are natural driers. In the parateepee, a rope or shroudline is laced to the poles, forming a circular drying rack for all clothing and a lean-to constructed properly in relation to the fire is a natural heat reflector. A rope stretched along the ridge pole, will dry clothing with a minimum of time and maximum of efficiency.

(6) Drying clothing within the sleeping bag. While the partial drying of damp clothing, such as socks can be accomplished by placing them between the layers of a sleeping bag and while it may be necessary practice at times, it should not be followed if drying can be accomplished in any other way, for liberated, the moisture from damp clothes will dampen the sleeping bag and the modern down bag is difficult to dry and loses heat insulating capabilities when dampened.

(7) Using snow as a blotter. If you should fall through the ice or become immersed in any way, upon getting out, roll at once in the deepest snow to be found in that immediate vicinity. Snow is an excellent blotter and will absorb the moisture before moisture has a chance

to freeze or soak into your clothing. Never take your boots off when filled with water, until you are protected by some sort of shelter. In case of such an accident shelter must be found immediately or made as soon as possible, for if the water in the boot becomes cold, you are in serious danger. As long as the water remains liquid, there is no danger of frostbite for a short period of time.

(8) Improvised clothing.

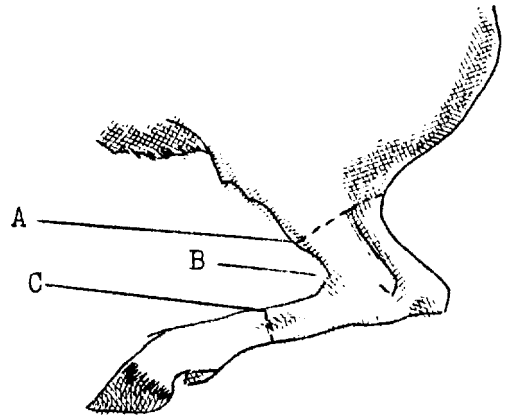
(a) Natives the world over and primitive man have been forced to make their own clothing in order to survive. There will be times, when a man living outdoors under primitive conditions, will be faced with this age-old problem. We have indicated in the foregoing pages, the proper steps to be taken in the use and care of clothing, and before finishing this lecture we should consider what modern man can do to implement his clothing or to actually improvise covering that will protect him in time of need. The first requirement in improvisation, is material that is an extra or can be spared from equipment, such as parachute fabric, harness, and shrouds after the wearer has reached the ground. Innumerable uses can be found for parachute fabrics. Making of any type of emergency clothing requires a

needle, which is almost a necessity. Needles are a valuable part of every emergency kit, but a wise man will always have one cached somewhere about his person. A good needle or sewing awl can be made from a can-opening key or, as the Eskimos do, from a sliver of bone. Threads forming a parachute shroud cannot be improved on for mending. Men who live on the frontier are inveterate collectors of small objects that may "come in handy." Wire, nails, buttons, a piece of canvas or tanned moose skin will rarely be overlooked. Any such object may be worth its weight in gold when placed in a hip pocket or a sewing kit. The next important step is to use such items in strengthening or mending garments that may require care. Continued travel through brush, will quickly wear out trousers and boot tops. Any kind of animal skin can be used for mending clothing, as a ground cover to keep your sleeping bag dry or clean or in mending or making gloves or mittens. Small skins can be used for similar purposes and insoles for boots, (although caribou, moose or Mountain Sheep skins) shaped to the foot with the hair singed to 3/4 of an inch in length on a hot piece of flat metal (cover of skillet) are

superior for this purpose.

(b) Moose Hock Shoes. The hock skin of a caribou, moose, or other larger game animal has been used since the day of the cave man for footgear.

Cut skin around leg at A and B. Separate from leg and pull it over hoof.

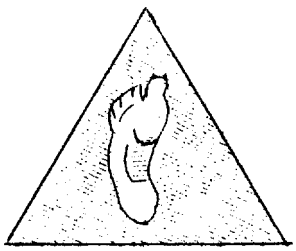


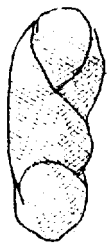
Shape and sew up small end C. Slit skin from A to B, bore holes on each side of cut for lacing, turn inside out, lace with rawhide, or parachute shroud, line with soft grass insole, and you have a serviceable shoe. Boots should be made while the skin is soft and green or softened in warm water.

(c) Grass insoles. Grass is used extensively by northern natives and whites for augmenting or preserving socks. Take any tall grass such as grows throughout the north, grasp a sheaf about 1/2 inch in diameter with both hands. The hands should be about 3/4 of an inch apart. Rotate the hands in opposite directions and the grass will

break up, or "fluff" into a soft mass resembling the soft grass nests made by different varieties of field mice. Form this fluff into an oblong shape, slightly larger than your foot, and about an inch thick and insert it gently into your boot. A little practice will enable you to spread it evenly. It will make an excellent insole. Remove it at night and make a new set for the following day. Removal of this grass will rid your shoe of some of the moisture accumulated during the day and hasten its drying. Grass makes a good bed and keeps your sleeping bag dry.

(d) Hudson Bay Duffle. It is difficult to realize in this age of luxuries that only a short time ago there were people living throughout the North, who had never seen socks. The Hudson Bay Company had a trade with the Indians for an item called "duffle." It consisted of a triangular piece of soft blanket material that was used as foot covering inside of moccasins, or native boots. It was adjusted in the following manner:





When the duffle was folded over the foot as shown in the diagram, the foot was eased into the moccasins and firmly lashed with the moccasin lacing. This type of foot covering, when worn with moccasins, has a few advantages over a sock for long wilderness journeys:

1. It can be washed and dried quickly.
2. The foot can be placed or "jumped" on different parts of the duffle as worn spots are formed.
3. It can be made of any soft material. Folded parachute fabrics can be used in this way.

(4) Emergency mits, mufflers, caps, and vests can be quickly made of any soft material. If the foot of a sock is burned or completely worn away, save the upper part for wristlets or mending. By unravelling the upper part of an old sock, you will get ample material to darn holes in a good pair.

VI RECOMMENDATIONS

1. Adequate cold weather clothing is the first pre-requisite for survival in the Arctic. Remember that clothing in itself is not warm, but it serves as an insulator to protect the heat developed by the body from the cold outside air.

2. The desirable characteristics of satisfactory cold weather clothing should never be overlooked or forgotten, namely:

a. That they must be good insulators.

b. That they must be non-compressible.

c. That they must be kept as dry as possible.

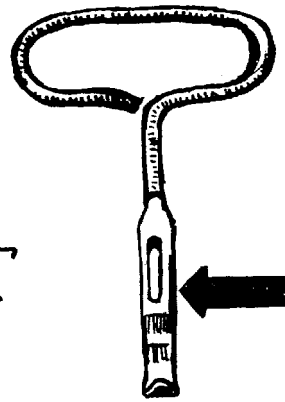
3. Garments possessing these characteristics and worn on the layer principle will provide protection against even the most adverse weather.

4. In survival you are on your own as far as your clothing is concerned, there is no re-supply and what you have must last you until the emergency is over. Learn now how to wear properly and care for your clothing. Needless to say, mending and cleaning of clothing whenever possible, will pay dividends in health, comfort, and safety. The old saying that "A stitch in time saves nine," is worth remembering.

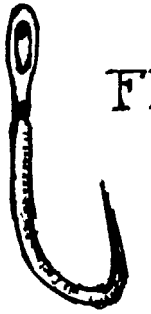
5. No man can operate safely or efficiently under outdoor procedure without string. Safe drying methods require string or its equivalent. Rope, wire, or thin poles.

6. There are no movies or musical radio programs around a wilderness campfire, so get out your sewing kit and "get to your knitting," you will never regret it.

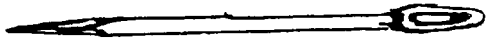
A CAN OPENER KEY ~ AND EMERGENCY TOOLS THAT YOU CAN MAKE FROM IT BY RUBBING WITH A FILE OR A SMOOTH STONE



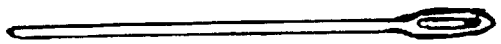
EYE



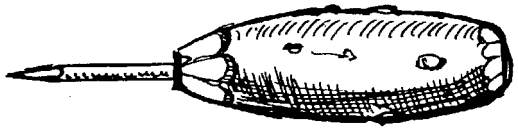
FISH HOOK



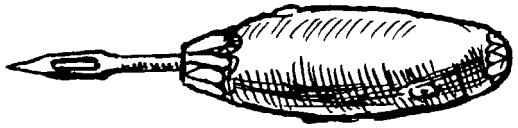
SAIL NEEDLE.



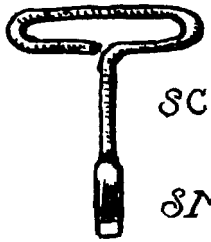
DARNING NEEDLE.



PEGGING AWL.



SEWING AWL.



SCREWDRIVER FOR SMALL SCREWS.

IN COMBAT, TORN EQUIPMENT IS DANGEROUS—TO YOU

Baltimore Browne A.I.

27 March 1951

LECTURE FOR INSTRUCTORS

BASIC SURVIVAL TRAINING

I. TITLE AND DURATION

a. Title. The SAC Survival Rifle M-4. Course No. B2E-7a.

b. Duration. One (1) academic hour.

II. OBJECTIVES

At the conclusion of this period the student should know:

a. The construction, use, and care of the SAC Survival Rifle.

b. The capability of the .22 Hornet cartridge.

c. The use of the Survival Rifle in the procurement of game.

III. REFERENCES

a. Text references.

(1) "Practical Dope on the .22" - Ness.

(2) ".22 Caliber Varmint Rifles" - Landis.

b. Course references, (available for student use).

(1) E-1 Kit Manual.

IV. TRAINING AIDS

a. Diagrams of Survival Rifle.

b. Diagrams of aiming points of game. Vital areas.

c. Diagrams of comparative velocities, .22 Long Rifle .22 Hornet 30'06, etc.

d. Wild life pictures.

e. The SAC Survival Rifle, .22 Hornet.

1. Introduction. When the Pilgrims landed at Plymouth Rock armed with the cumbersome and inaccurate matchlock arquebuse, they established a milestone in the development of the North American Continent into a nation of riflemen.

Even as far back as 1620 AD, the rifle provided the medium for defense against hostile elements, the procurement of sustenance. In the overall evolution and development of early American Colonies, the rifle played a very important part. From 1776 onward our Independence was gained by the skillful use of the "Kentucky Rifle", and this same rifle provided food for both colonial troops as well as the non-combatant populations.

In the expansion of this nation to the west, the rifle continued playing an important role. To the Plainsmen, the rifle was second in importance to life itself. To the Frontiersmen, the rifle acted as a trail blazer and throughout our history, in all wars, we have depended upon the rifle for our continued existance as a nation.

Bear in mind that dependency on the rifle was manifested in our history and in the same fashion, you will have to depend on your survival rifle if you are ever forced to survive and live off the land. The survival rifle constitutes your most important possession as it may mean the difference between life and death.

2. Definition of Requirement. In establishing specifications for a bail-out type survival rifle, the following requirements were taken into consideration, namely, requirements for:

a. Light weight survival weapon, not exceeding 3-$\frac{1}{2}$ lbs in weight.

b. To be capable of killing small and medium size game at ranges not exceeding 100 yards. It will exceed this but is advisable to stalk or get as close to your game as possible.

c. To be accurate at 100 yards and group 2 to 3 inches when fired from a rest so that the average marksman can contain all shots in 4 to 5 inch circle, firing from a sitting or kneeling position, or what would be termed, "hunting conditions."

d. The survival weapon not to exceed 14 inches in length, 1-1/2 inches in depth for packing in bail-out containers.

e. That the caliber and type of the survival weapon be based on a consideration of existing weapons, past experience in survival, and related suitablility for its intended purpose.

f. That 100 rounds of ammunition not exceed in weight, 2 and $\frac{1}{4}$ lbs.

3. Comparison of Existing Survival Weapons - Bail-out Type. The .22 Long Rifle/.410 gauge 24 inch barrel survival weapon adopted during World War II, does not meet caliber requirements. A comparison between the .22 Long Rifle (rimfire), the .22 Hornet and the .410 gauge shotgun (3" cartridges-shot or slug) is described and from this analysis, the .22 Hornet was selected.

a. The .22 Long Rifle is not as effective for killing small or medium sized game as the .22 Hornet.

b. The .410 shotgun employing No. 6 shot against feathered game has an effective range of 15 yards. Employed against small-furred game, the effective range is 10 to 15 yards. Within

these ranges, the average hunter could effectively kill feathered and small-furred game with a .22 Long Rifle or a .22 Hornet.

c. The killing effectiveness of the .410 gauge slug is equal to that of the .22 than the .22 Hornet against medium sized game. Very close stalking would be required by the survivor/evader in order to bring game within effective range (approximately 25-35 yards) if a .410 gauge slug was used. Tests conducted by four experienced hunters in the US Zone of Occupation, Germany (194601°48) employing .22 Long Rifle - .410 Gauge Shotgun Survival Rifles, as issued to the AAF during World War II revealed:

Type of Game	Killed Range 25 Yards	Killed Range 35 Yards	Killed Range 50 Yards
Hares	21	7	0
Red Deer (65 lb)	4	2	0
Fallow Deer	2	2	0
Wapiti	1	1	1
Wild Boar	0	0	0

d. The weight of ammunition to be carried by survivor/evaders is an important factor. Measuring this factor in percentages of effectiveness desirability versus weight of weapon and ammunition, the following comparison is presented:

Caliber (bullet load)	Effectiveness Small Game (shot standing range 25 yds)	Effectiveness Medium Game (shot standing range 35 yds)	Weight of Ammunition 100 rounds per caliber
.22 Long Rifle (46 gr)	84%	28%	1 lb 8 oz.
.Hornet (46 gr)	92%	61%	1 lb 2 oz.
.410 (#6 shot)	48%	0%	5 lb 3 oz.
.410 (200 gr slug)	60%	12%	7 lb 1 oz.

e. Caliber Utility. It may be determined from the foregoing tables that while the .22 Long Rifle and .22 Hornet provided excellent results on small game, the .410 shotgun using shot or slug ammunition provided less than satisfactory results against small game. Velocities and energies for the .22 Long Rifle, .22 Hornet and .410 Gauge slug fired from 24 inch barrels are indicated as follows:

Caliber	Velocities (ft/sec)			Energy (ft/lbs)		
	Muzzle	100 yds	200 yds	Muzzle	100 yds	200 yds
.22 L.R.	1,335	1,045		158	97	
.22 Hornet	2,650	2090	1600	715	445	260
.410 slug	1,470	1,030		460	225	

Against medium sized game, the effectiveness of the .22 Long Rifle was inferior to that of the .22 Hornet while the effectiveness of the .410 shotgun ammunition, shot or slug was negligible as indicated:

Caliber	Suitability	
	Small Game	Medium Game
.22 Long Rifle	Yes	Yes (chance shot)
.22 Hornet	Yes	Yes
.410 Shotgun shot	Yes	No
.410 Shotgun slug	Yes	No

f. Assessing utility versus weight factors, the following are submitted:

(1) The utility factor of the .410 gauge barrel and ammunition is satisfactory against small game and questionable against medium game.

(2) The required weight factor of the weapon is 3-1/2 to 3-3/4 lbs. The weight of ammunition for the .22 Long Rifle is

8 ounces and 6-1/2 lbs for .410 gauge (50-50 shot and slug) or a total of 10-3/4 lbs for the latter.

(3) 35 pound maximum weight allowance for survival and evasion aids in established in order to permit mobility of flying personnel using the emergency bail-out kit in combat aircraft or maneuvering on foot on the ground.

TABLE

COMPARATIVE VELOCITIES & TRAJECTORIES

CALIBER	WT PER 100 RDS	M/V	V 100 YDS	V 200 YDS	M/E	E 100 YDS	BULLET WT. GR.	MID RANGE TRAJECTORY
.22 Super Speed	9 oz.	1375	1080		168	104	40	(100-200 300 yds) 2.9 inches
.22 Hornet	1 lb-3 oz.	2650	2080	1580	700	430	45	0.8-4-12.5
.410 Rifled Slug	4 lbs-12 oz.	1470	1030		460	225	1/5 oz.	
.30'06	7 lbs-	2710	2420	2150	2940	2340	180	0.7-3-7.5

Wt. Per. 100 rounds -

V - Velocity

M/V - Muzzle Velocity

M/E - Muzzle Energy Ft lbs

E - Energy ft. lbs.

4. The .22 Hornet Rifle. The .22 Hornet Rifle is normally considered a Varmint Rifle and is used on woodchuck, hawks and coyotes. It was developed in some form or another during the past 50 years, however, it was not commercially standardized until 1932, when Winchester placed on the market the first commercially produced rifle and cartridge.

The .22 Hornet has been successfully employed against Roe deer in Europe (as indicated in the preceding pages). It is an excellent cartridge for jack rabbits and wild hare and has killed wild boar and mule deer weighing up to 250 lbs. The .22 Hornet will kill cleanly and effectively if the bullet is properly placed, shooting from ranges of 50 to 150 yards wherein velocities remain comparatively high.

There is no noticeable recoil and the report is mild.

The .22 Long Rifle is accurate up to 300 yards in calm air, offering an average grouping of 90% (90 c 100) at 200 yards in a 4" bullseye ring. The .22 Hornet will offer the same grouping at 200 yards in a 2" bullseye ring. It should be understood however that these results were obtained while firing heavy barrelled target rifles under ideal conditions, which the survivor will not encounter in the field. The SAC Survival Rifle however will group 3-4 inches at 100 yards in the hands of the average marksman, after some practice. Five shot 5/8" groups are possible from machine rest at 50 yards.

The SAC Survival Rifle is equipped with a 14-inch barrel in order to meet requirement of packing in the bail-out kit. This reduction has decreased the accuracy at ranges over 150 yards and it is recommended that regardless of the type of game, ranges be reduced by stalking to under 100 yards, in order that the rifle perform at maximum accuracy efficiency.

Muzzle velocity with the 14" barrel is 2450 feet per second.

Remember, more big game is actually killed at ranges under 60 yards than over this distance. Unless it is impossible to secure a clean kill by closer stalking, never attempt to kill by shooting over 100 yards. Make sure of your first shot for it may be your last one at that particular animal, and your ammunition supply is what you are carrying.

Old time professional hunters employed the following approach:

a. Never shoot at big game unless you are under 100 yards.

b. Make certain of your first shot. A second will be futile except in following up wounded game.

c. Learn to estimate ranges accurately. You will be amazed in finding errors committed by the average individual when estimating ranges.

6. The SAC Survival Rifle, .22 Hornet. The SAC Survival Rifle (see Fig 1) is specifically designed to meet the requirements for a bail-out type weapon. It is a 5 shot repeating rifle, carrying 4 cartridges in the clip and 1 in the chamber. It may be fired as a single shot without using the clip. An extra clip is included in the bail-out kit.

The rifle is composed of six principle parts (see Fig 2):

a. Receiver.

b. Receiver and stock assembly housing, including trigger guard.

c. Bolt assembly.

d. Clip.

e. Barrel.

f. Stock and stock fittings.

Specifications:

Length, overall with barrel fitted and stock extended:	33"
Length, disassembled for packing (see Fig 3)	14"
Weight, rifle and component parts	3-1/2 lbs
Depth, disassembled for packing	1-12 inches

NOTE: The overall weight of the rifle (3-12 lbs) plus 150 rounds of .22 Hornet ammunition loaded with a 45 grain bullet brings the total weight up to 5 lbs 3 oz.

7. Instructions - Weapon, Survival M-4 Caliber .22 Hornet.

a. To Assemble Barrel.

Move bolt to the rear, back out barrel screw, screw barrel to receiver until shoulder makes up to the receiver, then line up index marks on receiver and barrel, tighten barrel screw.

b. To Open Stock.

Grasp barrel and pull stock rearward until locked.

c. To Insert Magazine.

Insert Magazine in opening until catch spring clicks, if rear of magazine goes in too far it will stop the bolt.

d. To Remove Magazine.

Squeeze magazine catch spring to the rear. Pull magazine down and forward to remove.

e. To Remove Bolt.

Loosen bolt stop screw 3 to 4 turns, grasp bolt handle, lift and pull rearward.

f. To Close Stock.

Depress button on left rear side of frame and push stock forward.

g. To Remove Barrel.

Move bolt to the rear, back out barrel screw until barrel is free to turn, after removal of barrel tighten barrel screw.

h. Magazine Capacity.

Magazine capacity is four rounds.

SAFETY

THE ACTION MUST BE COCKED BEFORE SAFETY CAN BE PUT IN SAFE POSITION.

8. Field Maintenance. Care of your survival rifle will insure proper function at a critical time. Care and maintenance requirements are simple and can be handled by an inexperienced man:

a. Keep barrel clean and free from oil and dirt, snow, mud, etc.

b. Keep the action, receiver walls, bolt and assembly clean and free from oil and dirt.

c. Don't use the rifle as a club, hammer or as a tool. It is a precision instrument on which your life depends.

9. Cold Weather Operation. Special precautions are required during extreme cold as in the use of any rifle.

a. Protect the rifle from snow and rain by improvising a cover from any available material. (This also applies in blowing sand, snow, etc.)

b. Do not place in a warm place as the metal will sweat and later freeze, as well as cause rust during mild weather. (Rust will not form under extreme cold conditions.)

c. Be sure the bolt and trigger mechanism is free of grease and oil. To operate properly it must be kept perfectly dry.

d. Cover the stock with some material, as a sock, etc., to protect the cheeks.

e. The rifle can be fired with artic mittens, so it is not necessary to remove gloves except to reload the clip. As two clips of four rounds each are available, more than enough reserve ammunition is available for a day's hunt under survival conditions.

f. As in all guns, care must always be taken to protect the muzzle from snow, mud or other foreign matter, as it will blow up, damage the gun, and perhaps yourself. Also, do not bump or deform the muzzle or gun will shoot wild.

g. Never attempt to shoot out an obstruction of any kind.

10. .22 Hornet Ammunition. The .22 Hornet ammunition is identified in various forms and types. A great number of gun nuts have developed various "wildcat" types which have not as yet been commercially standardized. For this purpose, selection was made of the currently commercially standardized .22 Hornet cartridge, loaded with a 45 grain soft point or hollow point expanding bullet. The soft point bullet with exposed lead tip provides better results against medium game, as the point is set for controlled expansion at ranges over 60 yards. Breech pressure is 30,000 ft lbs, a heavier cartridge would require a stronger, bulkier action.

At close ranges (25-35 yards) if employed against small game the bullet is liable to disintegrate causing extreme damage to the tissues. Against medium size game, the bullet will expand and develop its full energy.

The .22 Hornet cartridge possesses an extremely flat trajectory (see Table of Comparative Velocities and Trajectories). Use of the rifle will indicate that the same point of aim can be used from 25 to 150 yards without "holding over."

11. Points to Remember.

a. Rapid fire shooting is a waste of ammunition. Learn to shoot deliberately even on a follow-up shot against wounded game.

b. If you miss your first shot against game running through, load and get prepared for a second shot, but keep observing the direction taken by game in flight.

c. Indiscriminate shooting up to that point will only waste your limited supply of ammunition, alert and alarm all game in that vicinity.

d. Do not trust your first shot even if game appears to have fallen dead. Many a deer has risen a full minute or two after being shot and falling, and escaped the unprepared hunter.

e. Do not forget: The requirement for a good game-getting rifle is killing power within the range of the animal shot at and not at the muzzle.

f. An unalerted animal is much easier dropped than an alerted and frightened animal. A deer shot through the heart may run several hundred yards - if shot at when frightened - while it would have fallen in its tracks if shot while grazing.

g. Firing positions are of extreme importance. The SAC Survival Rifle is light and, any exertion or excitement will be magnified into tremors which reflected along the barrel will prevent the hunter from getting a sure shot. The prone poisition is considered as the best for a steady shot. However, in many cases, due to time or terrain conditions the sitting or kneeling positions will have to be used. Always take advantage of any object to use as a rest as a tree, stone, etc, but put your hand between rest barrel or gun, otherwise it will shoot wild.

h. Never attempt firing off-hand, unless the range is very short and time will not allow a change of position, because game is alerted and watching the hunter's movements.

12. Knowing your Rifle.

a. Know the limitations of your rifle.

b. Do not attempt shooting game at ranges over 100 yards.

c. Remember: the first shot counts and this generally is the last.

d. Select a vital spot. The neck spot is probably the best for medium and large game. Do not shoot unless a vital spot is open.

e. Avoid hitting heavy shoulder bones. That will only mean long and weary stalking of wounded game.

f. Always look for blood spoor if game runs away after the first shot. It may be fatally wounded. Light frothy blood indicates a lung shot, dark blood indicates arterial wounds.

g. If blood spoor is found, wait for half an hour before following and tracking down. Wounded game always lie down and stiffen if given time.

(For complete information on Hunting and Stalking see Course 13.)

13. Knowing Your Game. (See Course 13) For the purpose of identifying game and vital aiming points, Fig 4 (American Moose or European and Asiatic Elk), Fig 5 (American Wapiti or European and Asiatic Staf), Fig 6 (European and Asiatic Wild Boar), Fig 7 (European and Asiatic Roe Deer), Fig 8 (European and Asiatic Chamoix), Fig 9 (American Mountain Sheep or European and Asiatic Muffle), Fig 10, the common Fox, are herewith inclosed.

FIG 1

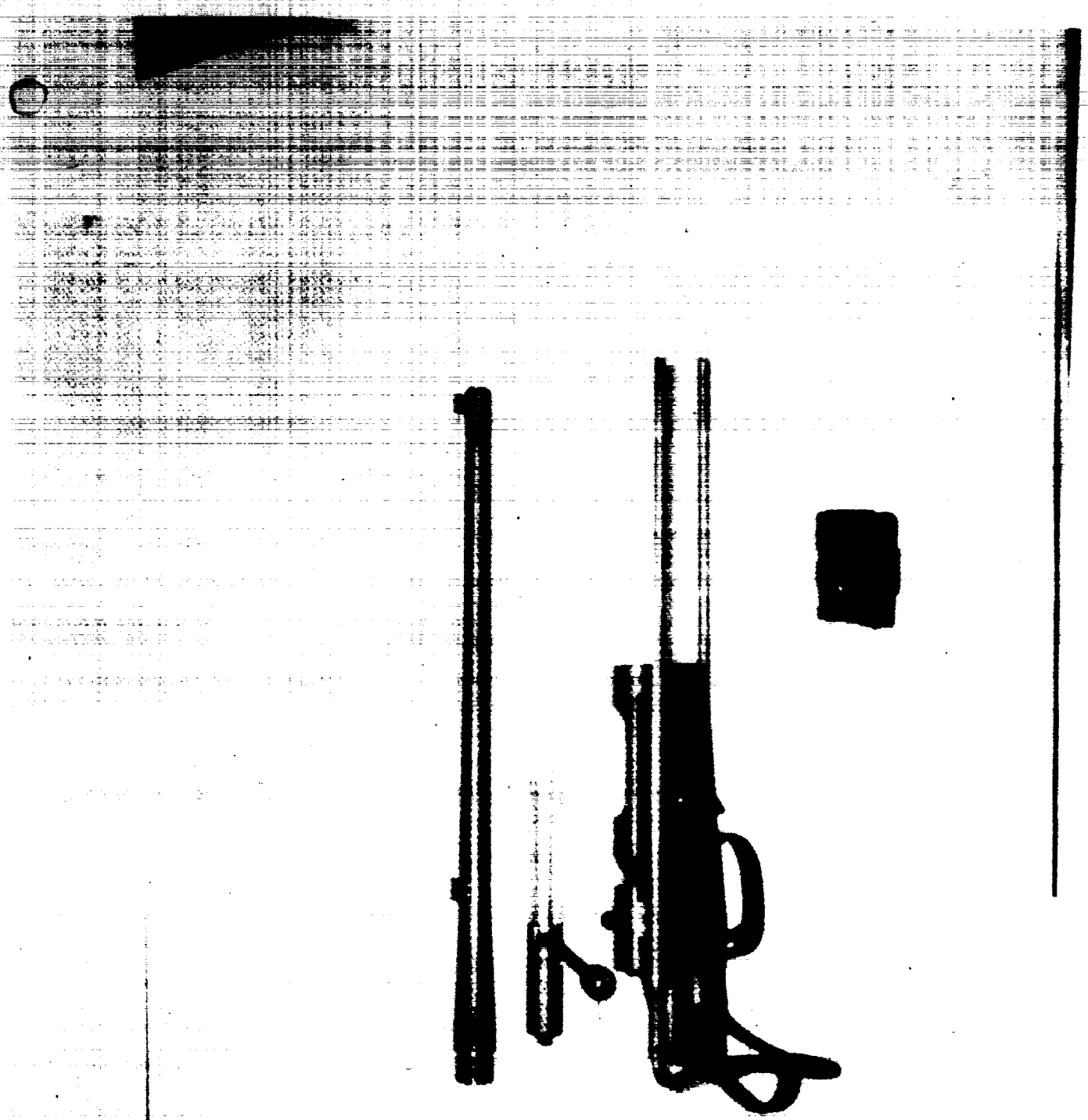


FIG 2

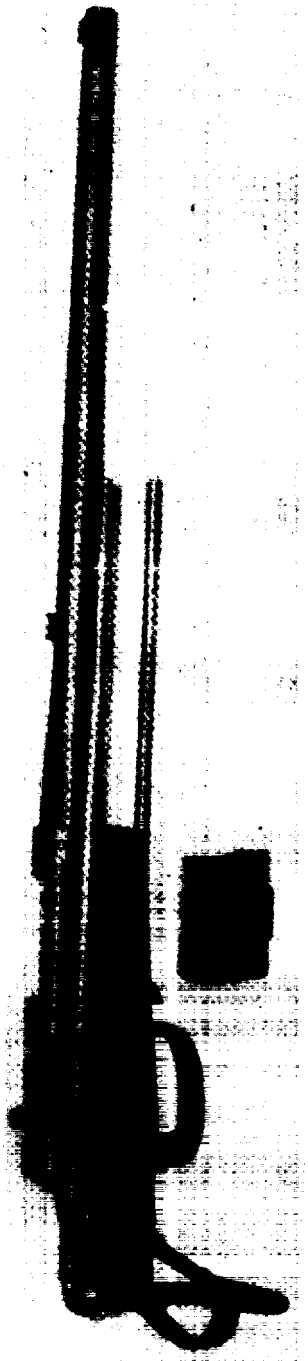


FIG 3

Figure 4

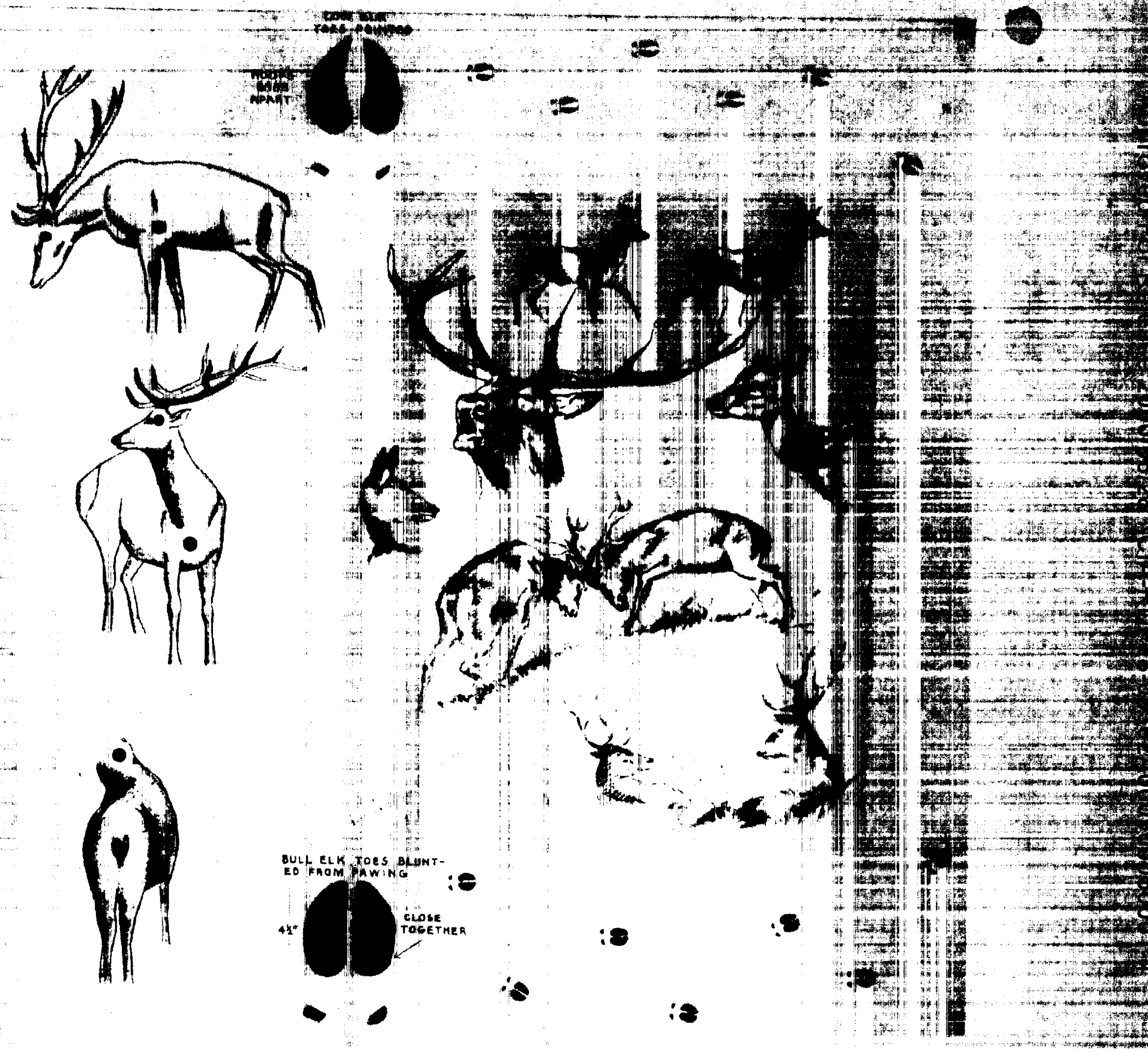


Figure 5

Figure 6

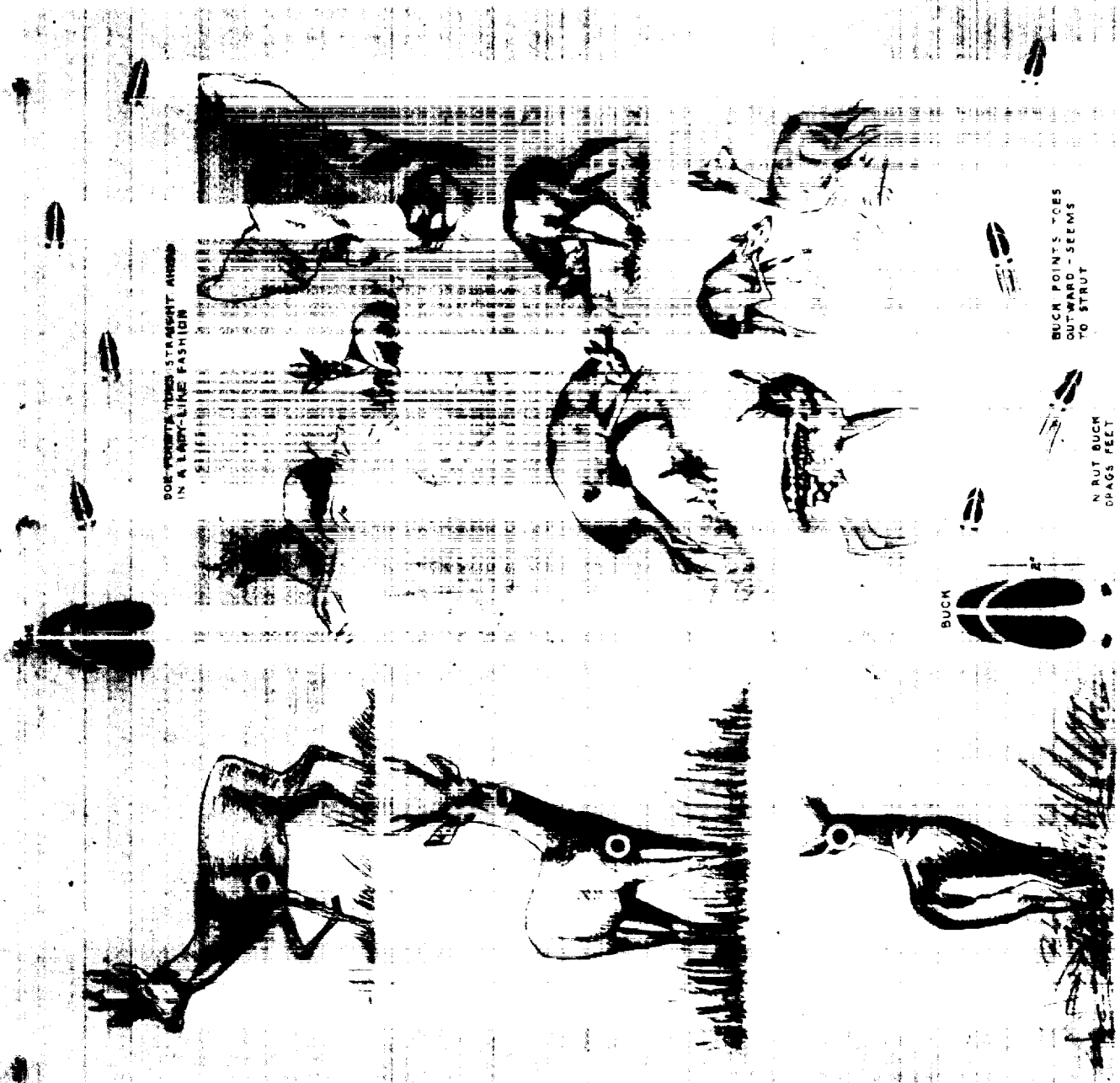


Figure 7

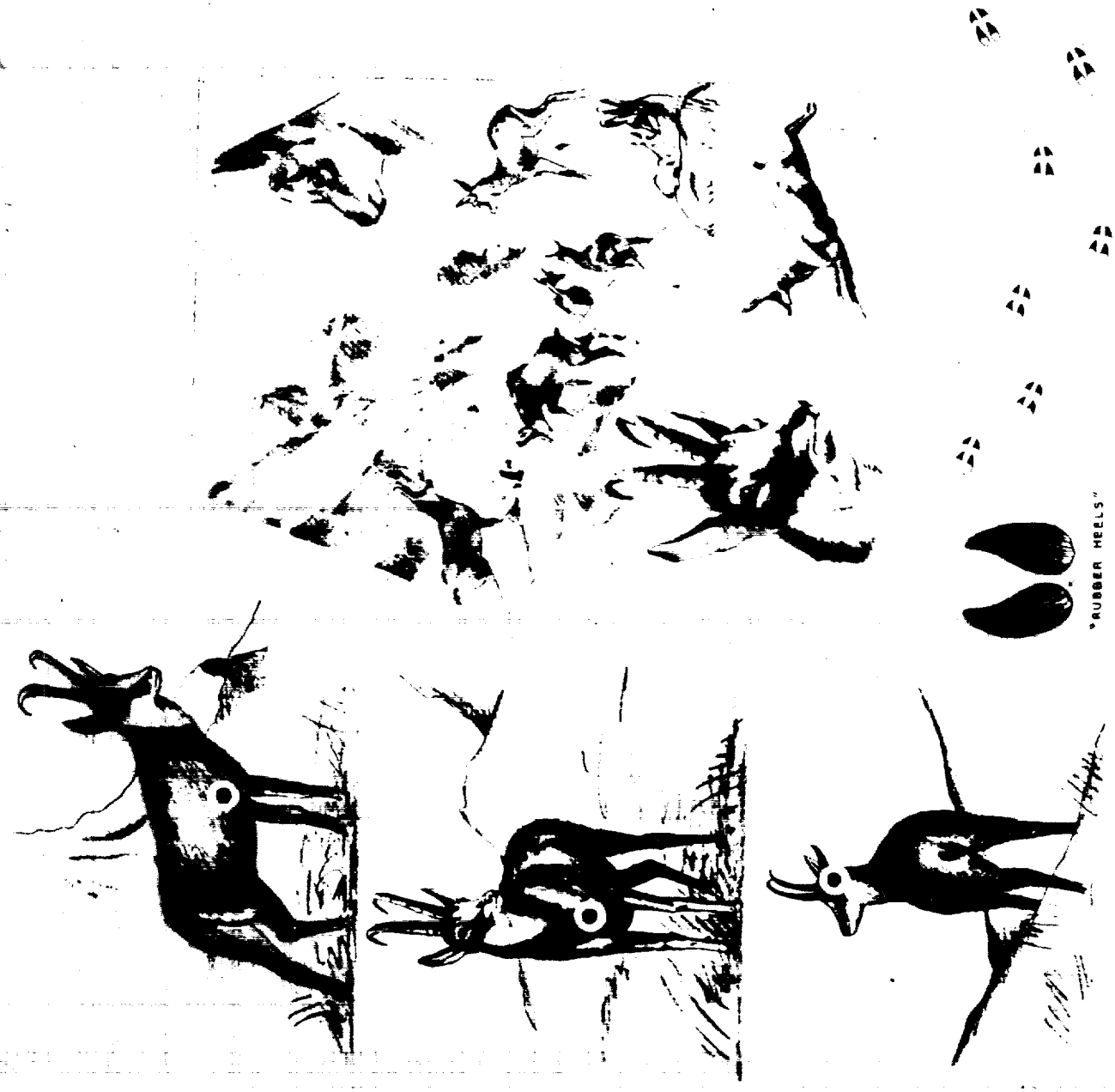


Figure 8

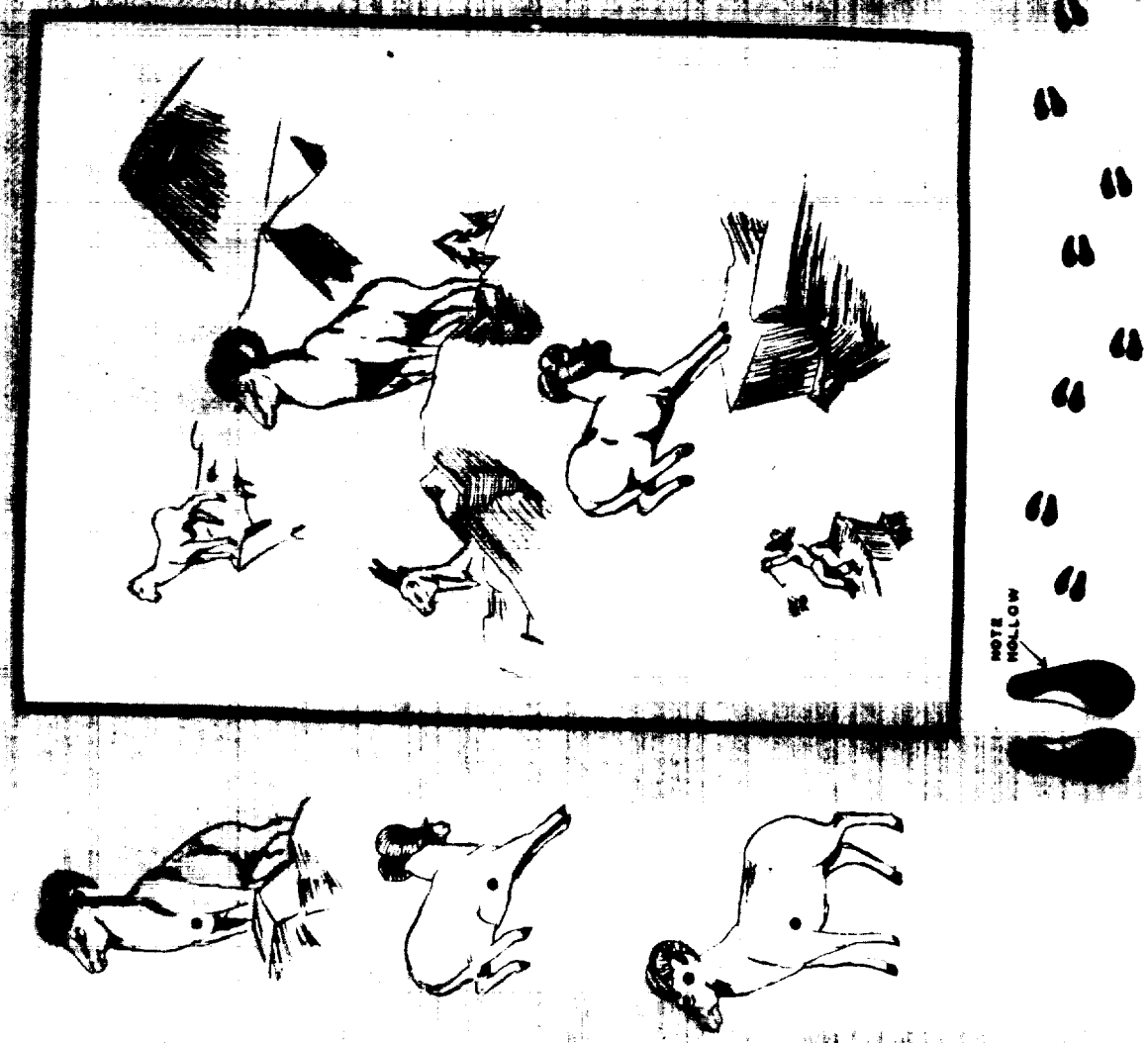


Figure 9

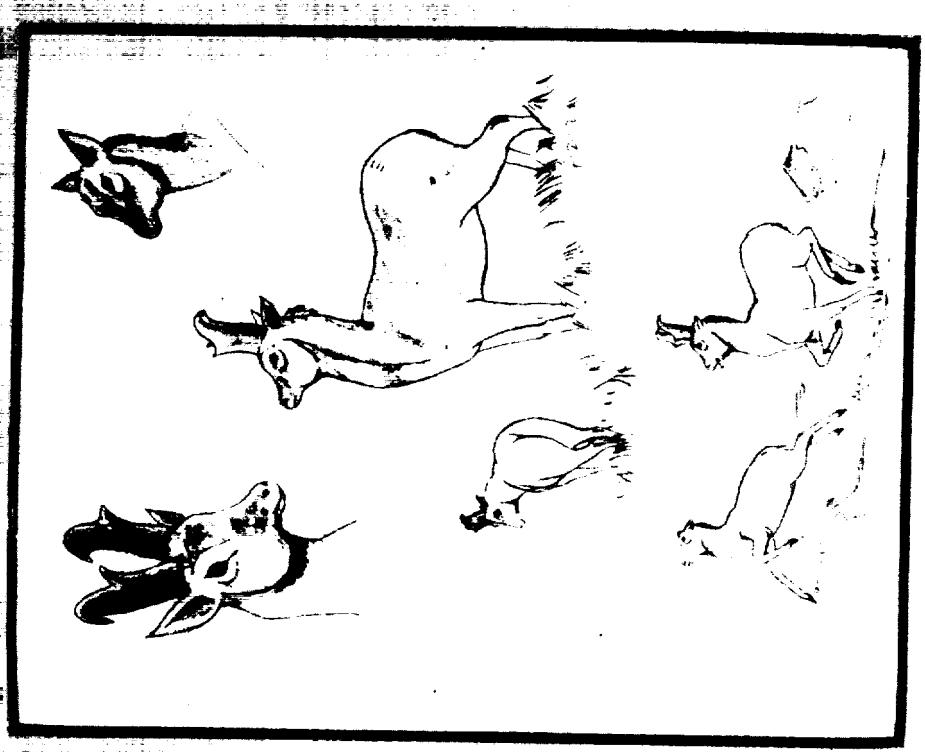


Figure 11

LECTURE FOR INSTRUCTORS

BASIC SURVIVAL TRAINING

NORTHERN HUNTING AND STALKING

I. TITLE AND DURATION

a. Title - NORTHERN HUNTING AND STALKING

b. Duration - One (1) academic hour.

II. OBJECTIVES.

At the conclusion of this period the student should know:

a. Types of terrain, species of game and their habits.

b. HUNTING: Methods for locating game and the proper use of field glasses.

c. STALKING: How to consider the sun, wind, sound and sight in stalking game.

d. TRACKING: How to track game.

e. Habits and food value of small game animals and birds.

III. REFERENCES.

a. Text references.

1. "The Friendly Arctic" - V. Stefansson.

2. "The Arctic Manual" - V. Stefansson.

3. "American Big Game" - 1946 Boone and Crocket Club.

4. "Hunters of the Great North" - V. Stefansson.

IV. TRAINING AIDS.

a. Lectures.

b. Field Demonstrations.

c. Wild-Life Pcitures,

V. PRESENTATION,

a, Introdustion. Hunting is a primitive instinct still strongly predominant in every man, In spite of the expanse of time since primitive man was a hunting and hunted animal, man still possesses today the urge for survival which has enabled him through centuries to forage for sustenance and conquer nature. However, there is a great difference between the "enjoyment to hunt" and the "Ability to hunt." The greater percentage of hunters today depend on guides to lead them up to their game. Using high powered rifles equipped with telescope sights and specially loaded ammunition, the modern hunter accounts for more game in an easier fashinn and at longer ranges. The net result of all this is that the excitement and satisfaction resulting from a difficult and successful stalk has given way to the science of ballistics, powerful visual aids, and transportation. The modern sportsman, by killing his game at extreme ranges, no longer requires the knowledge of hunting skill. To make matters worse, in so doing he fails to acquire an intimate knowledge of game habits. Successful stalking means difficult stalking; it requires continual application of patience, physical endurance, and experience. In our lecture we will attempt to eliminate these factors as the trainee who will undergo survival training will not be equipped with the most modern devices, namely weapons equipped with telescopic sights and other aids. The trainee will be armed with a specially designed weapon which has certain limitations as to range and shocking power, so that close and careful stalking must be accomplished in order to "bag his meat".

b. Use of the .22 Hornet Rifle. (See Lecture, SAC Survival Rifle.) Before hunting with the SAC .22 Hornet Rifle examine for a moment the rifle which you will depend upon to secure you sustenance. The SAC .22 Hornet Rifle weighs 3½ pounds; it is a 5 shot, clip loading, bolt action; the stock telescopes and the 14 inch barrel is detachable by opening the bolt and unscrewing the lock screw. The complete weapon can then be packed in a space 14 inches long. The velocity of the Hornet with the 14 inch barrel is 2450 feet per second. The rear sight is a peep sight giving the hunter a clear view of the animal he is shooting at. This rear sight is the type used by experienced hunters. In other words, your survival rifle, while small and compact, is an efficient weapon, which, when employed correctly will secure game and provide for self-defense. Remember to depend on the first shot and at ranges under 100 yards wherever possible.

c. Types of terrain, varieties and habits of game. With the exception of the migrating caribou, which will on occasions blunder into a northern settlement, game will always be found in the wilderness, well removed from human habitation.

1. On the flat and open Arctic prairies, the only large grass eating animals will be the caribou and reindeer, since, the musk ox or "Ovibos" has been driven back to the Arctic Islands.

2. In Sub-Arctic timbered areas, which run well north of the Arctic Circle, moose will be found in low river valleys. They range from the valleys to timber line and on up to the highest slopes, namely, areas where willows or low bushes grow.

3. Both the caribou and moose may be located in low, rolling mountains and high hills, as in such areas they can forage for their favorite food. The

winter diet of the caribou is "caribou moss" or lichen grass; that of the moose is willow. During the summer, caribou and moose eat varied types of lush vegetation.

4. White mountain sheep will be found in high mountainous regions which rise to snow-capped peaks.

5. The black bear is omnivorous and travels where his fancy dictates, ranging from the lowest valleys, where he forages for fish, frogs, and roots, to high mountain sites, where he lives on small rodents and berries.

6. The Grizzly Bear, west of the McKenzie River will be located in mountainous or semi-mountainous country, well to the rear of the sea coast. While the Grizzly is edible to a certain extent, the flesh is usually tough and the flavor is unpleasant.

7. One species of Grizzly Bear, called the "Barren Ground Grizzly", is located in mixed open and wooded country, ranging from the McKenzie River to the Hudson Bay.

8. The Polar Bear is a native of the polar icepack and depends largely on seals for sustenance. Polar bear flesh is good, however, recent reports confirm that trichinosis has been identified in polar bear meat. This precludes eating raw Polar bear flesh under any circumstances, and steps should be taken to insure that polar bear flesh is well cooked. The same applies to the meat of all species of bears. Sickness from eating polar bear liver has been attributed to poison of some sort and although no deaths have occurred the survivor should refrain from eating it.

9. Seals are found throughout the Polar Sea as well as in Sub-Arctic waters. There are many varieties of seal and all are edible. The "hair" seal

and the "sea lion" are numerous in Sub-Arctic waters and can be killed from the coast as they climb out on rocks and sand beaches to sun themselves. The seal is food, fuel and clothing to the Eskimo and its pursuit has become highly specialized.

(a) Open water hunting. Any man who has hunted wild ducks on open water can quickly adapt his experience to seal hunting. The seal hunter takes a stand in the same fashion as the duck hunter who hides in the grass close to a lake or marsh. For seal hunting the rifle is used and the seal should be shot through the head, as it is less likely to sink than if shot through the body. In retrieving seals from open water, the Eskimo uses a wooden ball, into which steel hooks are imbedded. The M'NAK, as it is called, is fastened to a long cord, and when thrown beyond the seal, can be drawn up to the seal's body, the hooks imbedding in the skin when the cord is jerked. This same system is used by duck hunters to retrieve birds beyond their reach, only in this case the MANAK consists of a piece of wood and a length of fish line.

(b) Stalking Seals on Ice. In stalking seals baking in the sun on ice, a greater degree of skill is required, as the hunter must imitate the sleeping seals, so that he will be accepted as another seal until range is closed to a point where a sure shot can be made.

(c) Winter Hunting. Harpooning seals in their ice breathing holes is not a practical method for survivors to follow, as it usually constructs about six breathing holes which are used in

turn. Hunting consists of waiting patiently by the breathing hole, spear in hand, until the seal comes up for air. A slender piece of bone is inserted into the breathing hole through the snow and as the seal rises to breathe, this marker is pushed upward and the hunter plunges his spear into the seal's head.

10. Small game of different species will be found throughout the Arctic and Sub-Arctic lands and islands. Regarded purely from the viewpoint of sustenance, it may be questionable whether small game hunting is justified under survival conditions. This question would depend on 2 factors: (1) The ability of the survivor to secure it and (2) the prevelence of small game. For long survival periods the capture of big animals is far preferable because of the greater amount of fat secured. Stefansson favors big game to pull a party through Arctic survival. In his case, however, seals and, to a lesser degree, caribou, polar bears and musk oxen are plentiful. The importance of seal meat is that is always carries a good amount of fat and it is the only source of fuel to be found on moving ice floes.

d. Hunting: Methods of locating game and the proper use of field glasses.

1. The large grass eating animals usually feed in the early morning and rest until mid-afternoon, then feed until dusk and rest again during the night. The feeding habits, however, are influenced in many ways; by climatic conditions, position of moon, availability of food, insects, number of predatory animals, and prevalence of hunters.

2. Hills and mountains are a natural feature of assistance to the hunter, for a hunter can look down into forested or brush areas and see game

animals where it would be impossible to locate them in flat country. Hence, the first lesson a hunter must learn, is the utilization of high land for locating and stalking game. When the hunter is positioned on a ridge that dominates the surrounding lowlands, he is in an excellent position to locate game, but there are procedures of vital importance that he must follow. He must keep off the sky line; he must have the wind in his favor and he must cover the terrain in all directions with his field glasses. In other words, he must take every precaution to see the game, without being seen, "scented" or heard.

3. Next to knowing your rifle, the proper use of field glasses is of paramount importance. An animal may be stumbled upon accidentally, in open or gently rolling country, however, this will rarely happen. In color, the hide of a caribou blends with the surroundings, but a single animal or herd may be lying down in a willow thicket, with only the upper part of the antlers in view. The ability to locate an animal under such circumstances requires concentration and proper use of a monocular. Field glasses must be used scientifically. The glasses should be employed from a sitting position, with a back rest if available, and both elbows braced on the knees. When surveying the terrain at extreme angles, extending beyond the clear field of vision of the glass, it is preferable to lie prone and build up a small pile of flat rocks, capped with a glove or other soft material, to steady the glass. Select a prominent point, and survey the landscape within the areas covered by your glasses, without moving them. After surveying from this position, shift the glass to cover a second area and follow this system until the surrounding country has been carefully surveyed.

4. In all probability, a number of "possible targets" will be located that might be game. These targets must be re-located with great exactness so

that they can be identified a second or third time, for if some distant dark or light spot disappears, the supposition would be that it was a living creature. Shadows cast by the sun may change the shape and size as the sun moves, or the wind may cause bushes to move, but the possibility of discovering game will warrant closer approach. Remember too, that you are seeing only a part of the terrain, for the other side of the hills may be concealing game. As you advance, examine carefully the entire countryside as you change positions.

5. If you locate game with your glasses the chances are good that you can kill it, provided your stalk is skillfully executed and you shoot accurately. Spotting game through your glasses may mean the difference between food or starvation. Even a moose that is almost black in color may appear white when the sun shines on the skin, so do not pass up a single chance, investigate every object carefully that might be a wild animal.

e. Stalking: Influence of sun, wind, sound and sight when stalking game.

1. Sighting: An animal does not compare events or remember incidents as man does. If an animal has been previously shot at/or has seen other game killed, it will be exceedingly shy for a considerable period of time. Game animals in areas where predators abound are more alert against an attack by carnivorous animals than against an attack by man. Animals cannot estimate rifle ranges, but if they see a wolf sitting on a hill, they decide that it is time to more. If an animal out of rifle range spots you, it will eventually maneuver out of sight. While it has not identified you as a human being, its suspicions have been aroused. The best thing to do is to stand absolutely still for some time, allowing the animal time to settle as it may still be observing your movements from the further side of a hill or thicket. After a long period of time has elapsed, start moving slowly downwind and at a right

angle to the course taken by the animal. If it is a caribou, (for caribou frequently circle downwind to catch your scent) you may intercept it in its course and get a close shot. While it is more difficult to stalk animals that you have accidently frightened, you must never give up hope. They may be the only animals in the area and if you give them an hour or two to settle down, you may be able to re-locate, stalk and get your meat. There are no infallible rules in hunting. In survival, however, there is one ironfast rule, "Time is never wasted so long as you get meat in the end". There are a number of rules governing stalking, that, if followed meticulously, will get you within shooting distance.

2. IN STALKING AN ANIMAL TRY TO STAY DOWNWIND. AVOID GAME PICKING UP YOUR MAN-SCENT AS THIS WILL SCARE GAME AWAY. In mountain hunting, where winds are constantly changing and eddying, this rule may be difficult to follow. Mountain game may remain near one spot for several days, so if they are unapproachable today, try again tomarrow. Do not allow yourself to be seen. One exception would be in the case of a large, scattered herd of sheep or caribou, where an animal that you have not seen, may suddenly come over a hill and see you first. Constant vigilance and the skillful use of cover will overcome this. This problem rarely occurs while hunting moose, as moose are solitary animals and will rarely be found in herds exceeding four or five head.

3. Sound. In hunting either mountain or flatland game a normal precaution should be taken against making the slightest noise or sound. You can stalk within 30 yards of a moose and not know it, until a crashing of branches, followed by silence, tells you that your moose has heard, spotted you and departed. A windy day is best for hunting moose in thick cover. In willow covered or timbered terrain the method used will be similar to that followed

in caribou hunting. The following story will illustrate disregard of noise by mountain sheep. Two hunters reached a spot directly above and about 70 yards from a band of "bighorns". One shot was fired killing the closest ram. After a few minutes of nervous milling around, the band returned to their feeding, the hunters remaining concealed until the band finally disappeared. These animals were wild and unaccustomed to the presence of man. Sounds are magnified in the mountains; rock and snow slides roar downward, thunder reververates and a great boulder falling from a precipice resounds into a tremendous crash. Mountain game would starve if they stampeded every time a rock rolled, but despite these constant noises, every precaution should be taken by the hunter to escape detection and scare of the game. From expert hunters throughout the years, three hunting and stalking methods are handed down:

(a) In hilly or mountainous country, use high peaks and ridges as vantage points to locate game without allowing your body to appear against the skyline. Great care should be taken to secure a favorable wind.

(b) In level, open country, good vision and favorable winds are mandatory.

(c) In wooded country, both favorable wind and complete silence are definite requirements.

f. Animal Signs.

1. The word sign, or track when used by hunters, encompasses all indications of the past or current presence of animals in any given area. The antlers of deer, elk, caribou and moose are cast or dropped in late winter, and finding cast antlers is an indication that a bull has been in that location during late winter and an examination of the "weathering" of the horn will

indicate how many years have passed since that animal stood in the location. Numbers of bull caribou antlers of different ages in a given spot may be accepted as an indication that the area is a caribou wintering ground. Cow caribou are the only female ruminants who carry antlers, but they are so irregular in the growing and dropping of their antlers, that it is difficult to assign a definite time of year to the cast antler of a caribou cow.

2. Trails would normally come under the classification of signs, also indications of browsing, such as willows eaten by moose, which are very noticeable, and can be recognized against beaver cuttings by the difference of trails and wood chips made by the latter. Broken and rubbed trees are evidence that bull moose were present during the latter part of the summer, as bull moose have the habit of rubbing off the outer soft skin or "velvet" of the antler, in early fall. The presence of cast antlers, rubbed trees and "browse" of different types will confirm that this area is a promising hunting ground.

3. Signs of animal droppings are of great importance in determining the presence of game. The difference between winter and summer droppings of mosse are so great, that they will confuse the inexperienced hunter who will think that they were made by different animals. In the winter, the moose feeds on a dry diet, lacking sap. Droppings are oval and elongated, resembling in size and shape a pecan nut. In the summer, when their diet is filled with sap and mixed with aquatic plants, droppings resemble that of the domestic cow. This is also true of elk. The seasonal changes in the sign of other game animals is not so conspicuously different. In all hunting practices there is a constant requirement to interpret correctly, clues left by passing animals.

4. The presence of mountain sheep can be determined by their trails, which criss-cross the talus slides of the mountain in easy gradients, mounting to the highest summits and ridges. Sheep beds are almost always made on level formations of gravel or crushed rock and consist of small flattened or hollowed areas pawed out by their front feet. On leaving their beds sheep usually defecate and the "weathering" of this sign will allow the hunter to estimate the time that has transpired since sheep used the spot.

g. Tracking: The ability to track down game.

1. Capturing a wild animal by tracking can be fairly easy or again it may require considerable skill. In open snow covered country, trails made by a roaming band of caribou can be seen for along distance. All snow tracks such as those made by moose, bears or smaller game are easy to follow, but that does not imply that securing the animal will be an easy task.

2. While following a trail you should keep well to one side, usually downwind and circle, to locate the trail at intervals. In open country this is comparatively easy, but trailing a lone moose in snow covered woods, requires the highest degree of skill. This is a case, "Where silence is golden", for if a snow shoe rattles on a dead branch, or a "Whiskey Jack" flies away with a warning call, you will probably lose your moose. The difficulty in this type of hunting is that you may be within a few yards of your animal and yet never catch sight of it. Furthermore, moose have the habit of running or trotting for some distance before lying down, and traveling in a circle so they can survey their back trail. If timber is not too thick, tracking an animal becomes much easier. By keeping to one side of the trail the hunter has an excellent chance of getting meat.

3. In theorizing on the art of stalking, a statement is frequently made that if you approach an animal without being seen, heard or "winded", you can shoot and get the animal easily. Under certain conditions in the hunting of certain species of game this statement is true. But one important factor is demanded and that is that the stalked animal does not travel out of the area where the stalk is in progress. This type of stalking is known as "blind stalking" as the hunter will never see his game until he has maneuvered in the position to shoot. In hilly or mountainous country and particularly hunting mountain sheep or caribou, the "blind stalk" is superior to any other method. When a band is located, lying on the side of some distant slope where there is not enough cover, the hunter will have to make a careful reconnaissance of the mountain skyline, so that he can recognize every dip and hill from the opposite side. He then turns back from the location where game was sighted, and making a long detour, crosses, the range, downwind from the quarry. In approaching the far side of the ridge, beneath which the game was seen, great care and silence must be observed, for during the overall period of this stalk, sighted game may have changed positions. But, even if the animal or herd has moved, the hunter has attained a commanding position above and behind the game, which should enable him to secure his quarry.

4. The fact that game cannot be seen from the top of a hill does not mean that it is not there, for animals will frequently bed down under a ledge or on the down hill side of a brush patch, where they are invisible from above.

5. Once more the final word of advice to the survival hunter is "use your glasses". While traveling use your glasses from every hilltop and in every rest period. While in camp, keep your glasses hanging in a readily available place and turn them at intervals on the surrounding hills. Many a

moose and caribou have been killed from a well hidden camp and one great advantage of the lean-to type shelter is that you ahve a constant view of the surrounding country at all times.

6. If you see a brilliant flash on any landscape, it will indicate the presence of man, for while antlers of moose and caribou and deer reflect the sunlight, nothing in nature, (except on occasions, water and ice) can equal the brilliant reflection cast by metal equipment carried by man.

h. The habits and food value of small game animals and birds.

1. The types and quantities of small game animals inhabiting the hills and forests of the north is beyond belief. Everywhere through the grass, there will be trails made by species of mice. The "microtus" or voles abound, a short tailed field mouse with some species growing to a considerable size. Voles nest and hibernate under the snow in large numbers. Then there is the "lemming", the Arctic hares, foxes, marmote, ground squirrels, and birds such as the ptarmigan - a member of the grouse family. It would be a serious error for a survivor to disregard the value of this teeming wild life.

2. The best way to snare small rodents in quantity is to sink tin cans, half filled with water, in their runways. This type of small game is clean and lives on grass seeds and roots, becoming very fat in the fall.

3. Ground squirrels can be hand caught in rock piles or by laying a noose of fish line on top of their burrow, pulling the noose when the head of the animal appears. Northern Indians locate the position of ground squirrels and marmots in rock piles, by imitating the sniffing and blowing of a grizzly bear, which causes them to appear on the surface, making a chattering noise.

4. In the past days of the north, the porcupine was called "the prospector's friend", for once located, it could be killed with a stick. In

frontier areas it was protected by popular agreement as an emergency food. A large porcupine may weigh up to fifty pounds and the meat is palatable. In the days when both Whites and Indians wore mocassins, discarding of a porcupine skin without burning the hide of singeing the quills was regarded as a serious offense, for the quills continue to be a menace to humans and animals for several years after the skin has rotted. The immediate singeing of the skin is advisable as it removes the danger from the quills and facilitates skinning. Occasionally a porcupine will be infected with tapeworm, so a careful examination of the intestines is advisable before using the meat.

5. Muskrats are found throughout the north and are easy to snare; their meat is nourishing and palatable. Their hides, case-skinned and turned inside out to dry, make excellent emergency mitts.

6. Ptarmigan are afraid of a stealthy or direct approach. Therefore approaching ptarmigan, stand erect and circle slowly about, like a grasing caribou moving in on the birds in narrowing circles. Under certain climatic conditions they become more wild but several birds can be killed out of one flock, using stones or even a pocket knife, thrown downward at a bird close to your feet.

7. Next in importance, in food value to the meat of big game, is that offered by fish and eggs of wild fowl. During the spring and summer months, in almost every inland pond and marsh, nesting geese, ducks or curlew will be found. If you see a bird rise from a patch of grass, hurry to the spot, for a nest of eggs may be waiting for you. If the eggs float when placed in water, they have young forming, but when boiled they will be edible. Along the shores of large lakes or the sea coast, sea birds will nest in numbers, and during April and May, eggs can be gathered in any number desired. Sea gull eggs are

larger than a hen's egg and are equally as good. When boiled, there is a slight fishy taste from the thin filament separating the meat from the shell.

VI. CONCLUSIONS: The requirements necessary for survival hunting and stalking are:

a. Patience, intelligent observation, constant watchfulness, willingness to eat any wild food, however "queer" it may look.

b. Careful study of wildlife habits and ingenuity in capturing different species. In many respects you are better equipped than the average native, for you hunting equipment is the best available. So if an Eskimo, or a Hottentot can do it - "So can you"!

9 MARCH 1950

LECTURE FOR INSTRUCTORS

BASIC SURVIVAL TRAINING

I. TITLE AND DURATION

a. Title - NORTHERN FISH AND FISHING.

b. Duration - One (1) academic hour.

II. OBJECTIVES

At the conclusion of this period the student should know:

a. The value of fish as food and the vast quantities of fish in the North.

b. The kinds of fish found in northern seas, and methods of capture.

c. Kinds of fish and fishing in Estuaries.

d. Streams and lake fish, and fishing methods.

e. Method of gaffing fish.

f. Details of the E-1 Vest Pocket Fishing Kit.

g. Use of the Emergency Gill Net.

h. Rudiments of Fly tying.

i. Methods of making a Survival Fishing Rod.

III. REFERENCES

a. Arctic Manual - V. Stefansson.

b. Alaskan Animals and Fish - Frank Dufresne.

IV. TRAINING AIDS

a. Demonstrations.

b. 3904th Training Squadron Lectures and Diagrams.

V. PRESENTATION

Introduction. "It has been established that a diet consisting exclusively of fish and water is quite as healthful as a diet exclusively of mammal flesh and water." (Stefansson)

To a man who understands and likes fishing, no area of the globe will furnish a better outlet for his talents than the North. From huge rivers that flow to salt water from their mountain springs hundreds of miles inland; from the myriad smaller streams draining scarcely known wilderness areas, to the unnumbered thousands of clear lakes that dot the Arctic prairies and hills - the north is an immense fish hatchery. It has been stated that Great Slave Lake alone, could supply the fish demands of the U.S.A. When one adds to the inland waters the vast fish resevoirs of the North Pacific, Bering and Polar Seas, the fish potential assumes astronomical proportions.

If the actual facts of the fishing in Alaska and Northern Canada were known, every fisherman in the United States would, (but for his wife) mortguage his home and go there!

But, our approach in this lecture is not for Sportsmen, but to offer the best possible instructions in the simple method of taking fish for Survival purposes.

SALT WATER FISHES

In survival salt water fishing, we must envisage a party following a wild sea coast without the benefit of boats. Fishing under these circumstances will demand the use of hooks and lines, used from places

where deep water can be reached from rocks, ledges or the outlets of fresh water streams.

Fish of fascinating shapes and colors may be schooling beside the deep sea kelp beds, but food, and not fun is our object.

Perhaps the best fish caught may be a young, or chicken halibut. The fish will weigh 6 to 10 pounds in favored localities. On sand or gravel bottoms, a line weighted with a stone and baited with the breast of a dead seabird found on the beach, can be left out with the fair certainty of catching a halibut.

NORTHERN COD, GREY COD, "TOM COD"

Several varieties of Codfish will be found in Northern waters and will take a baited hook readily. In schools, young Cod will take a bare hook.

FLOUNDERS

On sand and gravel bottom, Flounders will take meat, fish or shellfish bait.

SCULPINS

Many Sculpins are found in northern waters. They will take almost any bait.

SAND SHARKS

These sharks are found throughout Bering Sea and Northward. On a walk of 10 miles along a Bering Sea beach, three Sand Sharks, measuring 5 to 7 feet in length, were found stranded. Two of the sharks were still alive. Their value as food is doubtful.

As previously stated, the varieties of fish and their numbers increase in deeper water, but the above list will, if obtainable, go far towards providing a food supply.

The wealth of life on certain sections of northern beaches is enormous. If, in shallow, sandy or weedy bays, you see slight depressions, dig there with a pointed stick, and you may be rewarded with the best of all shellfish, the northern scallop. Clams too, may be found in certain areas. Either will make the best of fish bait or food.

One of the greatest difficulties the beach fisherman will encounter, will be in getting his hook into deep water. This can be accomplished at times, by tying on a rock sinker and throwing it with the line carefully coiled on the beach. If this is not successful, the sinker can be placed on a piece of driftwood and floated outward to deep water with the help of wind. currents or tide. When the full extent of line is reached, the rock is pulled from its float and sinks to the bottom. Hooks can be baited and tied at intervals along the line. An elaboration of this method, which will prevent hooks from catching on the bottom, is accomplished by tying a small wooden float to the anchor line and fastening the hook-line to the float, instead of the sinker, thus keeping the hooks above the bottom.

ESTUARY FISHING

a. Salmon and Trout Family.

Wherever a stream or river enters a northern sea, fish will gather. These will consist of all the varieties that run up rivers from salt water, such as salmon, Arctic char or "salmon trout", Dolly Varden

trout, and Steelhead, Hooligans and Inconnu.

b. The Eulachon, "Hooligan or Candle Fish".

This is a smelt-like fish that is so fat that when dried, it can be burned as a candle.

It runs into large rivers from the sea in dense masses that stream upward along the banks in dark lines. They can be easily bailed out with any type of can or net, are easily dried over a "smoke" fire and are excellent eating. For a short time after the "run" is over, they can be picked up on the sand bars. If the lower sides have become soft, they can be split and the upper side makes good food.

c. Inconnu, Connie or Shee-fish.

The Russian name for this grand northern fish is "Nelma" or white salmon. The name given this fish in the McKenzie River region - Inconnu - meaning in French, "Unknown fish" can still be used with reason, for it is just becoming known outside of the north. In appearance, it suggests a cross between a salmon and a giant white fish, and attains a weight of 85 pounds. It is a voracious, predatory fish and a terrific fighter, and those who know it, will claim that it is the best food fish in the north.

Cooked in any manner, it is delicious, but the claim is made that it is even better when eaten raw when frozen. The taste is likened to "fresh cream". The Inconnu runs up the rivers to spawn during the summer and then returns to brackish and salt water. All of the salmon and trout family will be found in the brackish waters of Estuaries.

ESTUARY FISHING METHODS

With the exception of the "holligan", all of the above fish are voracious feeders, which means that they can be caught with almost any type of moving lure, fished on the surface or deep. The list would include streamer flies, (preferably white), revolving or wobbling spoons, bass plugs, or strips of fresh fish. A piece of white cloth properly arranged on a hook would do. It should be well frayed out and tied in the manner of a fly.

During the winter, these fish can be caught by jigging through the ice, but a special ice chisel and scoop must be provided or improvised, as the ice will be six feet deep in places.

STREAM FISHING

Stream fishing in the far north cannot be surpassed anywhere, either in the quantity of fish obtainable or the varieties.

All of the fish mentioned under the section on Estuary Fishing will be found throughout the extentof streams and large rivers. Salmon entering the Yukon River from the Bering Sea, travel up-stream a distance of 2,000 miles to spawn.

The ling, or kusk, a Cod-like type of fresh water fish, is found in all lakes and rivers, its liver is unusually large and is considered a delicacy by northern natives.

Pacific Salmon on their spawning journey do not eat, but on occasions they will strike at artificial lures. The best method of catching them, would be by gaffing. The large hook in the Emergency Kit should be

lashed to a long slender pole. The hook end or gaff is held close to the bottom until a salmon swings directly over it. The pole is then gently lifted upward and the hook driven home with a sharp pull.

It is truthfully stated that all the Pacific Salmon die after spawning, but a fact not stated, is that they are still good food up to the time they stop moving. Nothing can look less edible than a dying salmon. Scratched and torn by battling hundreds of miles of rushing water, snags and boulders, its skin blotched with red and purplish welts, its bones visible through gaping wounds, it looks almost poisonous. A party of Thlinkit Indians on the upper Stikine River left camp for a nearby slough, and picked up some of the dying fish, cleaned them, out out the frayed holes, and cooked them for supper. The only white man in the party, after watching the proceedings with some trepedation, decided to take a chance and found the fish excellent.

When salmon spawn, all the trout family gather to the feast, and their love of salmon eggs is such that you would wonder that a salmon egg is left to continue the species. While trout fishing with salmon eggs is quite rightly frowned upon as unsportsmanlike, it is quite in order as a Survival procedure.

Just as during their stay in the Estuaries, all of the trout family andthe Inconnu continue to take artificial lures as they move up stream. Streamer flies, spoons and plugs, when of the correct color and form, will bring them rushing upward from the deep pools. But these powerful fish, including the large rainbows and steelhead, may run up to 20 pounds and

correspondingly heavy tackle must be used to landthem, but the Survival fisherman will not possess the limber rods and expensive reels that enable a heavy trout to be captured on light tackle. For these fighting fish, heavy flies, leaders and lines must be used if you expect to "horse" them out of the water on a willow pole.

If, when fishing under Survival conditions, you should chance to see some heavy fish lying under a bank of a deep pool, it would be foolish to attempt to catch them on a willow pole. Lash your gaff to a pole long enough to reach the fish. Stalk them with the care you would use in creeping up on a moose. In getting your gaff into the water it may be best to have a companion wade into the stream from the opposite bank and disturb them sufficiently to make them move. The instant they leave, get your gaff in position and through a small blind of brush, await their return, which will be comparatively soon. If you can gaff your fish just under and behind the gills, it will kill it quicker and you can pull it out easier.

Two hunters in the Northern Rockies of Canada, discovered three very large Dolly Varden trout lying in a deep pool. Bending a copper pothook into a gaff, they filed it to razor like sharpness, flattened the shank with a hand axe and lashed it on a slender pole. The fish weighted 8, 10 and 11 pounds, respectively, or 29 pounds of fine fish as the result of a half hour's work and some patience. The fish, even if hooked, were too strong to handle on a willow pole.

THE GRAYLING

When you find yourself on a stream or river that flows into the Bering Sea or the Arctic Ocean, you have reached the habitate of one of the

finest fresh water fish, - The Grayling. The Grayling was once common in some of the streams of our northern states, but they cannot live in water that is disturbed or poluted by man. In lower Canada, you may hear people speak of Grayling in the mountain streams, but this is an error, for the fish that they are speaking of, is really the Rocky Mountain White Fish, a fine game fish, but not to be mentioned in the same class as the Grayling of the far north. One example will illustrate its value to a party traveling under Survival conditions.

A party of four men and nine dogs were back-packing downward from the northern slopes of the Alaskan Range towards the tributaries of the Kantishna River, whose waters reach the mighty Yukon through the Tanana River. They had been out of touch with civilization for seven months and had a few pounds of caribou fat, but were "out" of store food. They had a rifle and ammunition, but under heavy packs had not stopped recently to hunt. Striking a small stream, they decided to follow it down until it got large enough to float a raft, whereupon, they would build one and start floating.

While pitching their first nights camp beside the crystal clear river, one of the men saw silvery flashes in the white foam below a rapid. He remembered that in his sewing kit he had two trout flies and a length of fish line. With eager haste, he cut a willow pole and from the shelter of a rock, cast his first fly, (a #8 Parmachene Belle) onto the foam-flecked pool. The instant the fly struck the water, it disappeared in an explosion of spray. There was a mighty tug and the pole sprang straight, with the fly

gone. The second fly was a well worn White Miller and with a prayer for better luck, the fisherman cast it after the first. That old fly held together through nine battles and that night, every man and dog in the party had a large Grayling for his supper.

The next evening, the battered fly was dolled up with some white hairs from a sled-dog's tail and a Ptarmigan feather found on a bush during the day's march, and nine more heavy Grayling came out of the river and into a frying pan of hot caribou fat. Two days later, a young moose failed to run soon enough and with a raft loaded with moose meat, the old fly was reverently put back into the sewing kit, along with some memories of one of the finest fish that swims. This is a typical case of Survival on a northern river when "Fortune Smiles".

Grayling may be found from brackish waters to the very head-waters of the smallest streams. In fact, they are found in small Tundra spring holes that apparently have no outlet, and whenever they are found, they are a hungry man's best friend.

THE GREAT NORTHERN PIKE - JACKFISH

Wherever northern rivers flow downward from the highlands, they eventually reach broad valleys where the water runs more slowly and back waters forming swampy lakes border the swift water. The water of these sloughs is dark and brown from the rotting moss and vegetation. At intervals the quiet surface of the still stretches will be broken by a great swirl that sends ripples rolling outward in broad circles. Watch closely and before the next break comes, you will see a great form two or more feet

long and of a greenish bronze color appear out of the dark depths and then fade from view. This will be a Northern Pike, and of all the fish that swim the northern rivers, he is the top killer. He feeds on any fish that comes his way and if a brood of young ducks or a young muskrat crosses open water, the pike will take his toll. While pike meat tastes good to a hungry man, it cannot be compared to that of the salmon, inconnu and trout.

To a Survival party, however, the pike is a valuable fish. The pike will take almost any lure that is tempting. Spoons, plugs, or a white rag "jig" will lure the pike. A hook attached to an oblong piece of a sardine can, once served as an excellent pike bait. During the last war, pike were caught on a hook attached to a soldier's "dog tag".

LAKE FISHING

The chief difficulty in lake fishing is to reach deep water, for many of the northern lakes, especially those in tundra or prairie country are shallow near the edges. Usually a point can be found where the water is fairly deep. Survival parties will usually lack the time required to build a raft for fishing, but in forested areas where dead logs are lying on the shore, a rough raft can be made by lashing two logs together with parachute shroud. Any kind of a pole will do to move the raft.

If fish can be seen rising, it would be wise to try your artificial flies, fished both on the surface and under water. If no fish take the fly on the surface, add a light weight to the line and fish the fly deep, retreving it with slight jerks to simulate the movements of a minnow or aquatic insect. If this method fails, you can change to a spoon, thrown into deep water by hand and retrieved slowly.

In the late afternoon or evening, lake fish will feed more freely and will work into very shallow water as darkness approaches. At this time they may strike at any moving lure. A slight breeze during the day time may also start the fish feeding.

One of the interesting features in lake fishing is the uncertainty of what you will catch. Sometimes a lake may be filled with trout, another lake within a short distance may harbour pike in good numbers, while at other times you may catch several different species in one lake.

The character of the bottom and the temperature and origin of the water will influence the kind of fishing you will get.

Channels where streams enter or leave a lake are always promising spots to find fish. Do not overlook small streams or channels - you can find pike in small streams that will weigh 8 or 10 pounds.

THE EMERGENCY KIT (FISHING) C-1

(One small plastic transparent square box.)

As it exists at present, the fishing kit is composed of the following items: A celephane-wrapped paper including:

1. (1) - #2 hook. Could be used for salt or fresh water bait fishing and could be attached to a pole for gaffing fish.
2. (1) - #4 hook. A salt or fresh water medium size bait hook.
3. (3) Salt or fresh water long shank hook. Could be used for streamer fly, or small spoon or plug.
4. (3) - #12 Salt or fresh water long shank hooks. Good for tying dry flies on.

5. (3) - 1/4 ounce lead sinkers.

6. (1) - Roll 18 pound test Cuttyhunk line. Fresh and salt water bait fishing. Not suited for surface fishing.

7. (1) - Roll 36 pound test Cuttyhunk line. Salt water or large fresh water fish.

8. Six (6) feet Nylon leader for flies. About six (6) pound test. Not adequate. After catching three 1 or 2 pound Grayling or trout, this leader would no longer be safe.

9. Six (6) feet stainless steel leader. Satisfactory for spoon or plug fishing in salt brackish water for large fish. Not very satisfactory for fresh water.

10. (1) - Wobbling spoon. Satisfactory for brackish or salt water, or coarse fish such as Pike.

11. (3) - Assorted trout flies, #10 hook. Satisfactory, but hooks too small fornorthern fish.

GILL NET

The Gill net is made of fine Nylon line and for that reason, will require exceedingly delicate and skillful handling to insure against breakage and tangling.

It is 14½ feet long and 4 feet wide in the center. It would be a very efficient fish net for streams and ponds. As previously stated, it would require the best of care and, where large fish (5 to 10 pounds) were caught, repairs made with thread from chute shroud lines would be necessary.

METHOD OF MAKING OR MENDING A FISH NET

a. A smooth flat stick, similar to a ruler and called a spacer, is used to insure equal spacing of apertures in net. (See Figures 1, 2,

3, and 4 of attached diagrams.)

USE OF NET

a. Outlets of streams.

b. Streams between lakes.

c. Streams.

d. UNDER ICE: Inlets or outlets of streams.

The net should be set across the current and tied to poles sunk in sand or mud.

It can be used by stretching across deep quiet flowing, but narrow streams. By beating water in progress towards the net, from either up or down stream, fish can be driven into the net. The upper part of the net can be buoyed and the lower edge should be weighted with stones or metal.

To set under ice, tie a long line to upper end of the net, and tie end to a long slender pole. Force the pole through hole chopped in the ice, and when full length of pole is under the ice, chop a second hole and move pole in direction desired, until outside holes are slightly further apart than the length of the net.

Remove the pole at the last hole and with the line, pull the net into the water, through the first hole, seeing that the weights hang clear. Anchor both ends of the net with a short stake driven through a small hole in the ice, or by piling chopped ice on the line and allowing same to freeze. (See Figure 5 of attached diagrams.)

TYING FLIES

The tying of flies that will catch fish, is a comparatively easy thing to learn. There are many enthusiastic and skillful fishermen who

never attempt this interesting form of handicraft, from the mistaken belief that it is difficult to learn or requires a special "gift".

As an encouragement to the faint hearted and specially Survival fishermen, whose stock of flies is necessarily limited, it may be of help to list some of the objects that trout and other game fish will swallow.

Trout have been observed to strike at almost every kind of leaf. Petals of the Indian Paint Brush (a scarlet flower growing in the Rocky Mountains) are frequently snapped at by trout.

In the outlet of Lake O'hara in the Canadian Rockies, a fine trout rose to the surface and swallowed a cigarette butt that was tossed into a pool.

Certainly the above record should convince any fisherman that fooling a fish is not too difficult a procedure. Besides, every trout fisherman has had the experience of taking fine trout on a badly chewed up fly. Were the truth known, an old moth eaten fly may look more like the real thing to a fish, than many of the elaborate creations, fresh from a sporting goods store.

So when your flies begin to wear out, start retying them. The first step is to wind any kind of thread on the shank, to give it a body. While you are doing this, you can wind a small piece of red wool or a few threads at the base of the hook to make a tail. (See Figure 6 of the attached diagrams.)

The next step is to tie on the wing. The wing may be any sort of a feather, trimmed to the proper shape, or soft dark or white hair, which

gives you a "streamer fly". Two wings separated, makes a dry or floating fly, but it should be oiled in order to make it float properly. (See Figure 7 of the attached diagrams.)

Don't worry if your first effort looks rough, it may catch fish just as well as the fanciest product in a fishing catalogue.

A small vice is usually used when tying flies. The hook end of the fly is held by the vice, which gives you both hands to do your wrapping and tying. It is perfectly possible to tie an efficient fly while holding it in one hand, but if you need a vice, you can make one quickly by splitting a piece of wood and lashing the hook between the two halves and in turn, lashing the wooden vice to an upright as shown in the attached diagrams. (See Figure 8 of the attached diagrams.)

If you camp in one spot long enough, it will be worth your while to improve your tackle. You can make good guides for your willow pole with safety-pins. (See Figure 9 of the attached diagrams.)

There are always times when fish go off their feed for some reason. You may see them in good numbers, lying head upstream, in deep pools. Be patient and keep trying, for sooner or later they will begin to feed and in a short time, you may have all you can use.

PATIENCE AND STICK-TO-IT-NESS are the most valuable traits in fishing.

T.S. #10

30 April 1951

LECTURE FOR INSTRUCTORS

BASIC SURVIVAL TRAINING

SNARES AND SNARING

I. TITLE AND DURATION.

a. Title - SNARES AND SNARING.

b. Duration - One (1) academic hour.

II. OBJECTIVES.

At the conclusion of this period the student should know:

a. Under what conditions, snaring wild animals will prove productive.

b. The principle of the three pin trigger and its application in forming various snare sets.

c. Methods used to cause animals to contact a snare.

d. Animal activity and movements.

e. Methods of setting the deadfall snare.

f. Conditions under which the deadfall is practical.

g. Food value of small game.

III. REFERENCES.

a. Arctic Training School. (Lectures and demonstrations.)

IV. TRAINING AIDS.

a. Lecture course.

b. Outdoor training.

c. Diagrams: No. 22, 7, 27, and 31.

V. PRESENTATION.

a. Introduction.

1. Individuals or parties operating under survival conditions will rarely, if ever, have the opportunity or need of constructing elaborate snares or traps for the capture of wild animal food. As long as the ammunition supply is ample and the larger animals such as caribou, moose, deer or seals can be found, it is the opinion of many experienced outdoor men that the expenditure of much time on capturing small game is time and effort wasted. There will, however, be intervals of time when the meat supply may be getting low and storm or fog makes hunting difficult, or the presence in the area of unfriendly inhabitants may impose a period of silence. The snaring of small game may then be very useful in carrying a party over a period of food shortage. In addition, a man without fire arms must rely upon snares; and there is the possibility that a survivor will find himself in just such a predicament in spite of emergency bail-out kits.

2. The main requisite of a successful snare is simplicity of construction. Generally, snares would be made after camp is completed but darkness may prevent efficient construction; so the trapper must work quickly and skillfully in order to have sufficient daylight to set his snares. In a party composed of several men, the most experienced trappers would set snares while the others make camp.

b. Principles of Snaring.

1. Two principles essential to constructing primitive snares are:

(a) The dropping of a weight on an animal.

(b) Catching an animal in a loop of wire, string, or rawhide.

2. There is something about snaring that appeals to the imagination of man. The need for ingenuity stimulates the imagination with the result that many books and hundreds of magazine articles have been written in which scores of different types of snares are described. Careful study will show, however, that every primitive snare -- with the exception of highly localized or specialized types such as the staked pit and bird-lime, are based on the two principles previously mentioned, which an Indian once described as, "pull up and knock down".

3. It is the object of this lecture at present ONE trigger or "set" that, thoroughly understood and properly used will fit any kind of snaring, whether it be used in subarctic, forest country, tropical jungle, or the rock cliffs of an island in the polar sea. It may happen that both instructors and trainees may have learned snaring methods in the southern states where the temperature rarely, if ever, drops below freezing and the twitch-up type of snare is popular. (The twitch-up snare is attached to a limber bent over tree, which, when the trigger is released, springs upward and suspends the animal in the air.) Under the best of conditions, this type of snare has serious weaknesses, but under severe conditions of cold it is useless as the bent tree will freeze in the bent position and lose its lifting properties. When the THREE PIN TRIGGER (the type of snare set advocated in this lecture) is used in conjunction with a lifting weight, it is superior to the bent tree twitch-up in every respect.

c. The Three Pin Snare.

1. Every trap or snare is dependent for lifting force on a trigger mechanism that holds the force under control until the contact of an animal "springs" or releases the mechanism, THUS ALLOWING THE FORCE TO OPERATE. The three pin trigger is the mechanism recommended in this lecture. (Diagram No. 22)

2. The trigger should, to obtain best results, be made from three smooth pieces of metal such as the steel rods of the pilot chute. For small animals up to the size of a fox or lynx, wooden pegs made of fire-hardened wood will prove efficient. No snare trigger known can be more delicately adjusted than the three pin trigger. For this reason, when it is attached to the trunk of a tree, allowance must be made for the slight movement of the trunk caused by the wind during the night. Even with this precaution taken, an extremely delicate set can be used.

d. The Loop Set.

1. The loop set is used to catch an animal around the neck. In its initial struggle the animals trips the trigger, thus freeing the weight -- a rock or log -- which, in its descent toward the ground lifts the animal into the air where it is less liable to be eaten by predatory animals during the trapper's absence.

2. The main advantage of lifting the snared animal becomes evident in the snaring of predatory animals such as the fox whose sharp teeth would quickly sever the snare line unless he were instantly jerked into the air, where -- if the noose is properly adjusted -- he would be strangled quickly. There is one important point in the twitch-up set that must never be forgotten. The distance the weight falls, be it rock or log, must be long enough to lift the animal off

of the ground. This point is easily arranged by setting the snare on the side of a hill or stream, where the weight will fall to a lower level than the spot where the loop or noose is set. (Diagram No.22)

3. Game trails usually follow ridge tops or the banks of streams and in either case the snare can be set in a spot where the weight has ample falling space. Furthermore, on the steep side of a ridge where game trails are frequently found, the log or rock will tend to roll farther and farther downhill with every movement made by the snared animal, thus drawing it higher from the ground, and choking it more quickly. Medium sized animals with their feet lifted off of the ground will either be strangled quickly or they will break their neck vertebrae.

e. Snowshoe Rabbit Snare. It should be stated in the beginning that the varying hare, or snowshoe rabbit, found in large numbers at certain times in the North, is, perhaps, the easiest of all animals to snare. It is true that the rabbit at the lowest part of its "seven year cycle" of abundance becomes scarce, but there are always a few present and their habit of breaking well defined runways in the snow or through willow thickets enables the trapper to discover their presence and set his snares with ease and rapidity. All that is needed ordinarily, is a short piece of wire or cord (one or two threads from a parachute shroud-line made into a noose will suffice) tied to a short length of wood called a "drag" to tighten the noose and prevent the rabbit from traveling far. Tying the end of the noose-line to a limber sapling (birch or aspen) that bends, when the rabbit struggles, is satisfactory.

f. How to Select a Spot for Snares.

1. In setting a snare, follow the rabbit or game trail to a point where

it becomes restricted by passing between two trees, under a log or between large boulders where the snare can be set to the best advantage. Even a few bushes, strong enough to support the "drag" above the runway will suffice to snare a rabbit. (See Diagram No. 22)

2. Snaring is simplified by the presence of snow, for a few cut willow twigs placed upright beside the runway can be used to direct an animal into the snare.

3. In the old days when western frontiersmen habitually trapped black and grizzly bears, a few individuals became so skillful in animal lore that they could catch a bear or wolf by either the right or left foot, as they wished, by so placing natural obstructions in the game trail that the animal would, without realizing it, place its feet in accordance with the trapper's plans.

4. Imagine yourself traveling barefoot along a mountain trail. You would note every sharp stone, stick or pine cone and place your feet in such a manner that you would guard against cuts or bruises. Even when wearing moccasins, the method of walking is entirely different from that followed when wearing hob-nailed boots. In the latter case you push your boot down firmly to get good footing while, when wearing moccasins, you place each foot gently on a spot that is level or smooth. Animals behave similarily in placing their feet and consequently set them down with care. The grizzly bear has two periods during the year when his feet are tender -- when first emerging from a winter's sleep and late in the summer when five months of travel and digging out ground squirrels have worn the foot-pads thin. In both cases they will keep away from snow if possible. A grizzly on the South Fork of the Athabaska, river in Canada, after the first fall of snow, traveled for several miles in a stream

bed, as the water was much warmer than the snow. No wild animal, horse or dog, likes to step on loose sticks or stones. Even a well-shod trail horse will change his step on a bad trail to insure a smooth foothold.

5. Knowing these facts the experienced trapper has learned that animals plan their footsteps more carefully than he does. The vegetarian and weaker animals are afraid of being heard, while the larger predators hunt by stealth, but both walk with caution, with the result that a few small objects skillfully placed can direct their movements. In snaring, therefore, the arrangement of the noose, twitch-up or dead-fall may be aided greatly by placing a log across the game trail to cause the animal to hold its head high or low, or by placing twigs to direct its course, or an obstruction to halt it, in a position where the deadfall can best operate.

6. If you fear that a trip-line may be too evident, an obstruction at the proper distance will draw the animal's attention from the smaller object. The best place to hide a wolf trap is in some natural opening at some distance from the dead animal the wolf is visiting, for his attention through fear of traps will be centered on the immediate vicinity of the carcass.

g. Animal Activity and Movements.

1. Animals are influenced by their surroundings and react to them in much the same way that men do. They, too, have their times for resting, eating, mating and playing.

2. Deer move down in the early morning to feed, climb back to a hillside about 7:00 A.M. and move downward to the valleys again at dusk. A trail snare for deer may catch them coming or going. From experience you will learn certain patterns of behavior for different animals. For example, rabbits or

snowshoe hares do a lot of night travel and day travel as well. Beaver, lynx and foxes, in fact all animals, are motivated to search for food. If you study carefully the feeding grounds and habits of wild animals, you will soon learn where to place your snares. Lynx eat rabbits, hence a good spot to snare a lynx is on a rabbit run.

h. The Deadfall. The deadfall can be used in capturing any animal from a pine marten to a black bear. Its value in survival is problematical in that where big game exists in sufficient quantities to warrant the expenditure of time and effort to construct a heavy dead fall, the rifle in the hands of an energetic hunter should bring quicker results. Large deadfalls are especially effective for nocturnal mammals.

i. The Bait Deadfall.

1. The best spot to build a bait deadfall is close to a game trail, beside a stream or on a ridge. The size of the deadfall and the bait used would depend on the kind of animal to be caught. No special care is necessary in attempting to prevent human scent from clinging to the deadfall, for such animals as rabbits, squirrels and procupines do not shy from strange scents and if your set is for predators or furbearers they will catch the scent of man regardless of your best efforts. The keenness of the sense of smell of a fox or wolverine is almost unbelievable.

2. Care must be taken to see that the fall-log slides smoothly between the upright guide posts and that the bait is placed at a sufficient distance from the bottom log to insure time for the fall-log to fall before the animal can withdraw its head.

j. Trip-string Deadfall. In this type of deadfall no bait is used, but the trigger is tripped by the animal touching a trip-string. This deadfall may be set across a game trail or any runway that is being regularly used by wild animals.

k. Ptarmigan Snare.

1. The ptarmigan is a member of the grouse family and is found all over the North in the open country. There are two kinds. The first is a small bird slightly smaller than a carrier pigeon and is known as the rock ptarmigan or "rocker". It spends most of its life among the high peaks and glaciers, and only descends to timberline valleys during serious storms. Occasionally it gathers in good-sized flocks, but usually there will be only a family group. Its main food is the buds and leaves of the low arctic willow. Because it lives in a wild and remote habitat, it seldom sees man and if approached in the manner described in the lecture, T.S. #12, can easily be killed with stones. Due to the fact that it is constantly on the move, attempts to snare it would consume too much valuable time.

2. The second kind of ptarmigan is the willow ptarmigan, a fine large bird which will weigh, dressed out, about the same as a spring chicken (broiler) Its range extends from snow-line downward to time-line and into open country in the lower valleys. During the fall and winter, it gathers in very large flocks. On occasions, a thousand birds may band together. Its favorite wintering grounds are the sand bars and islands of rivers, where the thickets of willow give it food and shelter.

3. When numerous, it makes well defined trails in the snow that run in every direction between the willow clumps. By suspending loops of fine wire

or parachute shroud threads from the overhanging willow branches, willow ptarmigan can be easily snared. Once the snares are in place ptarmigan can be driven into them by quietly and slowly herding the birds toward the snares.

1. Rodents.

1. If the total weight of the many varieties of rodents found in the North could be computed, it is possible that the figure would exceed the weight of the big game animals. Of one fact we can be certain, that if properly equipped, a man in the sub-artic would have no trouble in surviving on rodents. A survivor cannot, however, carry the great number of traps used by museum collectors to catch these small creatures, but a pail of any kind filled with about three inches of water and placed in a rodent runway in the tundra, in such a manner that the top is level with the ground surface, will frequently catch a worth-while number of rodents during the night. Such a catch would furnish a fairly respectable meal to a hungry man. Ground squirrels can be easily caught with a noose attached to a slender pole placed over their burrow. The mountain, or hoary marmot grows to a weight of 10 or 15 pounds and are a staple source of food among northern natives. They can be caught with a wire noose, and on rare occasions, captured in rock recesses by hand, or run down when they have strayed too far from their burrows.

VI. CONCLUSIONS. The training periods in survival procedures are going to be desperately short. Trainees will, in many instances, be woefully lacking in previous outdoor experience. In this lecture, we have chosen as a snaring trigger, one that will operate with great efficiency under the heat of the sun and the snow and ice of winter storms. We can say with conviction that it is as good as any other snare trigger and possibly better, for used with ingenuity,

skill and practice, it will choke and lift a rabbit into the air, break the neck of a large animal and fire a rifle. Last and most important, it requires nothing in the building that an airman cannot carry in a vest pocket when he jumps from a plane.

9 MARCH 1950

LECTURE FOR INSTRUCTORS

BASIC SURVIVAL TRAINING

I. TITLE AND DURATION

a. Title - OUTDOOR FIRE BUILDING.

b. Duration - One (1) academic hour.

II. OBJECTIVES

At the conclusion of this period the student should know:

a. The importance of fire building in Survival Procedures.

b. The proper use of Heat Tabs.

c. The importance of the care and conservation of matches.

d. The types of northern fuel: tinder, kindling and heavy wood and where they are found.

e. Preparation of wood for fire making.

f. Methods of fire making.

g. Safety in fire making.

III. REFERENCES

a. Arctic Manual - V. Stefansson.

b. Arctic Training School Diagrams.

IV. TRAINING AIDS

a. Demonstrations.

b. 3904th Training Squadron Lecture Course.

V. PRESENTATION

Introduction. Fire building is, next to food and clothing, the most important procedure in Survival. It is difficult for modern man to imagine the difficulties that primitive man had to contend with in producing fire.

In every primitive group, special individuals known as "fire-makers" were intrusted with the all-important responsibility of making and maintaining fires. It was their duty, when traveling, to carry coals in earthen recepticals or hollow log sections with which to start fires when camp was reached.

The primitive methods of making fires, that is, the friction produced by rubbing sticks and later, the flint and steel, are too well known to be mentioned in this lecture.

AIDS IN FIRE MAKING

a. Heat Tabs.

The main value of such an aid will be of greatest benefit during sudden emergencies, ach as immediately after an emergency landing at dusk or in darkness, where the discovery of proper fire making material is sifficult. As a cooking device it has little merit, but it may be of real value in starting the combustion of damp fuels. It should be used as seldom as possible, for the supply of tabs is limited and it is of the utmost importance that you master the techniques of fire building with the fuel locally available at the earliest possible moment.

b. Matches.

Without an adequate supply of matches, the average man would be in a serious predicamnt. In civilization, matches are so easily secured

that we treat them with reckless disregard. This is a national bad habit, for when traveling in foreign countries you will be instantly impressed with the fact that matches are seldom wasted. Under Survival procedure, you should literally count your matches, in order to know just how many you can use in a day, in order to have a sufficient number to last you for a month or longer. You should never use a match when a camp fire will produce the flame you need, such as a light for a cigarette.

KEEPING MATCHES DRY

There is no way in which matches can be wasted faster or in such numbers as occurs when you allow your matches to become damp or wet. Every match you own should be in a thoroughly waterproof box and when such receptacles are extras and not in regular use, they should in addition to their mechanical waterproof qualities, be securely wrapped with waterproof tape. You should also perfect yourself in the outdoor man's methods of protecting matches from the wind when struck, by cupping your hands, or using your hat, open coat, or other materials as wind breaks. You should use every match as if it were your last. Recommendations are being made for a larger number of matches in emergency kits.

FUEL (TINDER)

The experienced outdoor man begins "window shopping" for tinder for starting the evening fire a half hour or so before he reaches camp. Discovery of a good apply of firewood is a valid reason for camping earlier than planned. This statement of course, applies only to regions where wood is not easy to find, such as northern plains or certain stretches of sea coast where driftwood is scarce.

TINDER

Tinder is your fire starter and should be composed of bone dry and highly inflamable materials. In all far northern regions, grass is one of the commonest materials for starting fires. As you move south in areas such as the eastern, southern and western coasts of the Bering Sea, you will find a variety of redtop grass that grows so high and thick, that it can actually be used for cooking. In more barren country, you will find different species of ground cover, such as heather, mosses, berry bushes, dwarf birch and stunted willow.

Among these growing plants there will be many dead twigs, stalks and roots that properly assembled and used, will make good fires. Even in northern Ellsemere Land there is little difficulty in finding such fire-making material.

Where evergreen trees grow, and they are found well north of the Arctic circle, the tinder problem is instantly solved. The slender dead branches that curl inward close to the trunk, are protected from rain or snow by the larger, green growth above. These small branches can be broken off by hand in any quantity needed, and if bone dry, will start a fire without any other material.

The best evergreen tinder is the ends of branches that have died from natural causes, or have been broken by moose or caribou bulls while cleaning their antlers on the tree. Many conifers are killed by porcupines, who frequently girdle the tree while eating the bark. These dead branches turn a deep, redish brown and being filled with dried pitch, literally explode when a match is applied to the tips. These highly inflammable

branches are known as "Indian Kerosene" by woodsmen.

If a dead porcupine tree or a smaller supply of Indian Kerosene is found near camp, it should be gathered and stored in the Parateepee or under the Leanto for aid in starting fires easily and quickly.

SHAVINGS

The making of good shavings for fire starting is a woodsman's art. When Indian Kerosene or other quickly available tinder is not present, properly made shavings are indispensable. (See attached diagram.)

Making good shavings requires a sharp knife and a good eye in choosing straight-grained wood. Take dry straight branches or other wood, split it into thin pieces, with the grain, then with a sharp knife, shave off long, thin shavings to a point an inch or two from the end, so that the shaving is not seperated from the piece. Continue cutting the long shaving until the original stick is almost cut through. If properly made, a large cluster of curled shavings attached together at the base will result. Two or three of these clusters held in one hand and lighted will start a fire easily. Dry birch bark is one of the best fire starters.

KINDLING

Of equal importance with the proper kind of tinder is the kindling that once ignited by the tinder, produces the blaze that will in turn, ignite larger and even damp pieces of wood, such as damp roots or drift wood. Kindling must be small enough to ignite readily and a plentiful supply must be gathered before the fire is started.

FIRE WOOD

The experienced man is constantly on the watch for good stands or deposits of fire wood, and particularly when the time to camp approaches. There may be a valid reason for camping in a certain spot that can be seen in the distance. It may be a point of land on a lake or ocean beach where visibility or a broad outlook over surrounding country is advisable. The point chosen may be deficient in fire wood, so each man on approaching it would pick up enough dry branches or drift wood to insure the rapid cooking of the evening meal, after which a wood detail can collect a sufficient supply for the night and breakfast fires.

STEPS IN MAKING FIRES

Care should always be taken in deciding where to place the cooking fire. The prevailing wind, the character of the ground, the possibility of a fire hazard, the location and type of shelter used will all have a bearing on the location and type of fire used.

METHOD OF LAYING FIRE

"Begin by going backwards."

Thousands of fires have gone out because the builder didn't build backwards. Many men have frozen to death by making this mistake. The following steps should prove of some help to you:

a. First choose the place for your fire. In heavy snow and thick timber, see that there are no snow covered boughs above your fire, that will avalanche snow when the fire warms them.

b. Arrange your largest pieces of wood. If parallel, place little cross pieces or fire-dogs of wood or stones, under them to raise the

logs above the earth to insure a good draft. If a strong wind is blowing and you can't completely escape it, put your parka, pack on some boughs to windward so the wind will not interfere with your efforts.

If there is snow on the ground, dig down to the earth with a snowshoe. If the snow is too deep, make a firm platform of green limbs, preferably, to keep the fire from melting a deep hole in the snow. Build your fire on the platform with your large logs laid parallel. Build up a little square fence of kindling with one side open. Don't build a teepee shaped pile of kindling as you see so often illustrated in Air Force and Army pamphlets. If one stick burns through, the whole pyramid will tumble down. The square shaped frame will stay where you put it until your fire has caught. You can roof over your square of kindling with shavings. Before you strike a match make sure you have plenty of assorted sizes of dry wood close at hand.

Then take an ample handful of your tinder in one hand and with a match or your candle, if conditions are serious, light the handful and hold it gently in the open side of your small square of kindling. With the right hand arrange the roof of the shavings until it catches. Then add dry twigs, splinters of dry wood and your small kindling. When the blaze is strong and the larger pieces are burning add some larger split pieces. The advantages of holding the tinder in one hand is that you have it under control and can turn it one way or the other to stimulate the flame or protect it from air currents that are harmful. At any moment you can augument the tinder by the addition of an extra supply with the free hand.

The danger in the building of a teepee roof over tinder that is not controlled by hand is that the collapse of the structure frequently follows, but the self supporting fence and inflammable roof is about fool proof.

Adding large wood should be done gently and with good judgement. Two men working on the same fire are not advisable, except in cases where one man splits added kindling while the fire-builder arranges it. The best fire wood is made from dead standing trees, preferably conifers, killed by storm or fire. When cut into long lengths the small limbs should be trimmed off as they interfere with the proper arrangement of the wood and cooking utensils. When large fires are built it sometimes helps to use damp, or green logs for the base or parallel logs, as they burn more slowly and their function is to support the hot fire between, or cooking utensils laid on top of them.

In building a fire in a para-teepee, start it first in a square or triangle, as just described and build the fire into a teepee form when it begins to blaze freely. Fire building in a parateepee is always easy as the draft comes evenly and gently from all directions, and any wood kept in a parateepee dries out quickly.

When the wood supply is poor and frozen, split the large pieces and the ice in the cracks will evaporate over night. Stack spare wood close to a fire to insure its keeping dry, but not too close, or a change in wind direction might cause it to ignite.

In keeping a fire going all night you can use a large, punky log, rotten stumps with roots or put on a large armful of green willow. The willow will burn down to a bed of white, dead looking ashes, but gentle

fanning or blowing will turn them into live coals.

Do not build a fire where large roots are exposed or close to the surface. There is a Forestry record of a fire built in the fall that ignited the roots of an old tree. The roots burned all winter under the snow and when the ground dried out in the spring the fire worked to the surface, was blown into a large blaze by the wind and started a forest fire.

One last word of warning. In almost every army, air force and Boy Scout pamphlet on outdoor procedures and in almost all of the sporting magazines, you will find pictures of a leaning wall of logs beside a fire which is called "a reflector". It occupies one-half of the space surrounding the fire. Perhaps no one detail of camping is more firmly established in the minds of American week-end campers and yet it is not only useless as a reflector but also an actual hinderance to efficient outdoor procedure. Some of the reasons against its use follow:

a. It does not reflect, whereas the tautly stretched fabric of the leanto, be it parachute fabric or canvas is an excellent reflector.

b. It robs you of one-half of the fire space. In cold weather much of the work done is carried on beside the fire. With six or more men in camp, that takes a lot of space. You make your tea, mend snowshoes, dry your socks, or, on your return from hunting or wood chopping warm yourself beside the fire. For that purpose the largest available log in the neighborhood is laid lengthways outside of the fire. This log is the communal seat and work bench and one of the delightful features of life in the open. The erection of the so called "reflector" would instantly do away with all of these advantages, and give nothing in return.

c. One of the greatest benefits of the "long fire" when used with the fabric lean to in zero weather is the night fire. Before going to bed the cooking pole is removed and one or more ten foot logs are laid on the fire. Before long a wall of flame rises before the leanto, completely banishing the night frost. Men can change their underclothes and lean back on their sleeping bags while their damp clothes, hanging from the cross poles, get a preliminary drying.

This relaxing and refreshing period before sleep would be impossible with a reflector for, subjected to the intense heat of the night fire the reflector would ignite and go up in smoke, which, when all things are considered, is the best thing that could happen to it!

For complete directions on making a seal blubber fire in open see 3904TH TRAINING SQUADRON LECTURE, "SURVIVAL ON SEA ICE."

THE AUSTRALIAN "CHUFF CHUFF"

a. Material Required.

(1) Aircraft wreck (and trapped gasoline).

(2) Six to ten feet aircraft instrument tubing (aluminum will do but use preferably brass, bronze, or stainless steel).

(3) Oxygen bottle or hydraulic container.

(4) Survival equipment.

(5) Ingenuity and patience.

b. General Description and Use.

When your aircraft can be located after a crash - or where crash landings have been made on polar ice, glaciers or barren land this stove makes an invaluable heating and cooking aid. It requires no auxiliary

fuel, additional effort, or continuous feeding once properly constructed. It makes a valuable stove for providing heat in the para-teepee, para-shelter or leanto type of shelter where adequate ventilation is available. You will always be able to find not less than 50 to 100 gallons of aviation gasoline in the aircraft even if you have run it until the engines died. Every bit of that fuel represents usable heat for your body and food. Use it in this stove! It is not a bad idea to make one of these stoves while you are sitting around doing nothing in the squadron. Try it out to see that it works properly and then stick it in the aircraft taped down securely. If you did this you will have a fire going in less than 5 minutes after cracking up.

c. Principles of Operation.

Gasoline flowing down a 4 or 5 foot drop from a makeshift container passes through a metering venturi in the liquid state. Heating below this point from the fire and in front of the fire guard vaporizes the liquid which burns after it passes from the small jets. If the venturi is too large a resultant blow back up the tube occurs with the possibility of a dangerous spread of the fire. In the event that the container connection leaks, a plumber's bend should be put in the tubing well away from the fire and behind the fire guard. Precaution: This fire produces carbon monoxide gas and should only be used in a well ventilated type of shelter.

d. Construction (See diagram).

First take the open or fire end of the tube and using rocks or your axe close the end as tightly as possible by pinching it. When just a tiny crack is left (this can be determined by blowing cigarette smoke through the piece) curl the fire end of the tube in a circle as illustrated.

Use the file or pocket knife from your emergency kit. Start filing tiny holes on the inside of the curved piece, starting from the closed end. When the material is thinned sufficiently prick the hole with a safety pin, uniform insigna or clasp on your wings. Remember this cardinal rule: "When you can see the hole it is always too big". Be patient in filing and punching these jets and, to repeat, start first from the closed end. Punch a total of 6 to 10 holes facing toward the center, testing as you go along by blowing cigarette smoke through them. Now go back up the tubing approximately 2 to 3 feet and very carefully flatten a section being careful not to crack it at this point. This venturi restriction so formed slows up the delivery of the fuel to a drip and prevents a blow back of burning vapor into the fuel container. When you are satisfied that the tube is flattened enough give it several more whacks for good luck. Remember, aviation gasoline is very volatile and free flowing and all you want is a tiny drip below this point. If the tube actually is too restricted, that condition is easily corrected by raising the fuel container several feet which places more pressure in the line. Now fit over the tube just below the venturi restriction a piece of flat scrap aluminum - or if that isn't available - snow or comparable material to protect the tube and container from heat and flash back. When all this has been accomplished attach the bail-out bottle or other salvaged container full of gasoline. Drill a small air vent in the top of the container which can be easily blocked with a piece of wood, chewing gum, etc. If there is no shut off valve on the piece of tubing - to put the fire out simply block the air vent, permit the fire to die out and then lower the gasoline container - or conversely raise the jet end of the tubing. Use

caution in accomplishing your refueling. It is preferable to allow the stove to go out prior to refueling the container since spilled gasoline means burned clothing and probably hands and face; highly undesirable results, particularly in your predicament.

EMERGENCY FOOD IN THE ARCTIC

INTRODUCTION

In the Arctic the life of a man and the life of the animals on which he lives is more precarious than elsewhere. The margin of safety is always so small that even a slight change in climate may seriously affect whole animal populations and thereby also hunting conditions. Also, the game and fish resources of arctic and sub-arctic countries, due to reasons other than climatic ones, very greatly from place to place, from season to season and from year to year. No general statement as to the relative abundance or scarcity of game will always apply to any one region and nowhere is it less safe to generalize than in the arctic and sub-arctic regions. Thus, in one part of the Arctic, due to special conditions, a certain kind of game may be hunted by a certain method whereas in some other parts, due to other sets of conditions, the same technique may prove quite worthless.

Nevertheless, some broad statements as to the productivity of different parts of the Arctic are useful. For example, in Greenland and in the Eastern Arctic, land animals are few, and rivers and lakes, as a rule, cannot be depended upon to supply fish whereas the sea is comparatively rich in animal life. The Arctic Islands to the north of the continent also are poor in land game as is the sea animal life.

Large areas in continental parts of the Northwest Territories likewise are poor in game whereas the lakes and rivers are generally well stocked with fish.

In the Yukon Territory and in Alaska the supply of game animals is larger and more varied than elsewhere in the North because, generally speaking, a mountainous country affords more varied conditions for game than does a low, level country. One of the least productive of all types of country is the northern muskeg forest.

It is often safe to assume that any arctic country, not populated by natives, is not well supplied with game animals.

EMERGENCY HUNTING AND FISHING GEAR

The most useful "game-getter" in the North is a caliber .22 repeating rifle. A bolt-action rifle is more apt to cause trouble in cold weather than is the pump or lever-action type. A large caliber and more powerful rifle is needed for such game as bear and moose, but for general purposes and because of lightness and the lightness of its ammunition, most experienced hunters in the North, if limited to one gun, would probably choose a .22 repeating rifle. In Greenland many hunters use .22 rifles for caribou and seal.

At least 30 to 40 feet of 4½-inch mesh gill-net should be carried by all travelers in the North because anyone, even with a minimum of experience with a fish net, can catch a fish wherever they are to be found. The net should be "hung" and ready to use except that sinkers and floats may be attached or can be improvised when needed from local material.

A few fish hooks and some fishing line should be carried. For sea fishing and for lake trout 2- to 3-inch hooks are suitable; small hooks, ½ inch long and a few "flies" should be carried for brook trout and grayling. In all places where fly-casting might produce fish, a usable rod can be improvised from local material. Snares may be used for catching rabbits, ground squirrels, and ptarmigan. Ordinary steel picture-wire is excellent for rabbits while thin, soft brass-or steel wire is used for ptarmigan. A 200 foot length of 3/8" hemp line, a stout knife and a hand axe completes the every emergency equipment.

METHOD OF COOKING

The easiest and most satisfactory way to prepare fish and game under primitive conditions is by boiling in water. All sea-food is better if boiled in sea-water when no additional salting is required. When a cooking pot is not available, fish or game may be placed on a stick and roasted or fried over a slow, non-smoking fire. If no fire is available, fish or meat become more palatable if dried or frozen. Frozen meat or fish, before eating, should be brought to a temperature a few degrees below freezing since, when very cold, the frozen meat or fish sticks to the lips and the tongue. When carved or sliced in to thin shavings, it is really very palatable and does not appear "raw".

SEA ANIMALS AND SEA-FOOD

Shallow and ice bound seas are less productive of animal life than is moderatly deep water with pronounced tides and currents. For this eason Eskimo are more numerous in Greenland and Baffin Island than in the Arctic Archipelago. While the flesh of some sea mammals and fishes is more palatable than others, all can be used for food. The only exception is the liver of the polar bear, and that the bearded seal which are highly toxic.

WHALES:

The only whale that might be secured without special gear is the beluga or white whale. It is often plentiful in summer, on the sea coast, especially in Baffin Island, Hudson Bay and in the western Arctic. It may be killed with a rifle but, unless harpooned it will sink at once. It ofter frequents estuaries of rivers and may here be killed in shallow water where the body may be retrieved by means of a hook. Its flesh is very palatable. The skin of this and of all other whales is particularly good to eat and may be eaten raw or cooked.

SEALS:

Seals may be seen almost anywhere in the Arctic and can be killed by a small-bore rifle or with a shot gun. In summer the seals are often lean and will sink at once if shot through the head while during the rest of the year they are fat and will, as a rule, float. The flesh of all seals is good to eat and so is the fat. The livers (except that of the bearded seal) are choice. A small amount of fat should be taken with the meat. Seal fat or blubber can be used for fuel also. When cut into small pieces and placed in a shallow container such as a flat tin can or plate, furnished with a wick of otton or other suitable materials it provides a serviceable lamp and source of heat.

The most common seal is the small ringed or fjord seal which may be found almost anywhere in the far north. It is about three or very rarely four feet long. It is non-migratory and prefers cold, ice-filled arctic waters. It is a solitary animal that frequents deep fjords and bays. In winter it scratches and gnaws breathing holes through the sea-ice, and in spring crawls out on top of the ice to sleep in the sun. When asleep on the ice it can be approached to within shooting range by a hunter behind the cover of a white screen. It must be shot through the head, as otherwise it plunges through its hole and is lost.

The bearded seal is the largest of the seals and may be six feet long or more. It is less common than the fjord seal which it otherwise resembles in its habits, except that it prefers shallow water. The best raw-hide rope is made from its skin which also provides the best material for soles for native sealskin boots (kamiks).

The harbour seal is about the size of the fjord seal. It is more southern in its distribution and is rarely seen in ice-filled waters. It is a seclusive animal which frequents isolated places, where it often crawls up on solitary rocks.

The Greenland seal or saddleback is limited to the shores of Davis Strait, the northern part of Hudson Bay, and the North Atlantic where at certain times of the year it lives far from land on the drift ice. In size it is between that of the fjord seal and the bearded seal, but unlike these, most often appears in small flocks or herds. It disappears from the northern shores before the winter ice forms.

The hooded seal or the bladdernose is almost as large as the bearded seal. It lives far out to sea in the North Atlantic and southern Davis Strait and only for a short period in the spring frequents the coast.

WALRUS: Like the polar bear, is usually found in the pack ice some distance off the shore. It is easily approached when on the ice. It should be shot through the head since, if not killed instantly, it plunges into the sea and sinks.

POLAR BEARS: are rarely seen on land. They are marine animals and are most often found in the drift or pack ice some distance off shore. Their flesh, expecially that of the young bears, is excellent. The liver is toxic and should never be eaten. Polar bears, unlike the land bears, may be encountered throughout the winter. The Polar bear is one of the largest of the bear family; it is carnivorous and will attack man when hungry.

BIRDS: All sea birds can be used for food. Ducks, murres and other auk-like birds are the best, but even sea-gulls can be eaten. The eggs of all sea birds are palatable.

FISH: Fish of some kind or other is nearly always found along the shore of salt water. In the Eastern Arctic Atlantic-or Greenland cod may be caught with hand-lines or jigs in water from a few fathoms to 20 fathoms deep. The weighted hook should be barbed and about 2" long and when lowered to within a few feet of the bottom, should be jerked up and down. Bullheads are often found in shallow water near the shore and may be taken in the same manner. The flesh of fish or some white or shiny object may be used for bait.

In winter, fishing may be done through a hole cut in the ice. At low tide emergency sea food may be obtained on the beach. Mussels or clams obtained in this way should be taken only when fresh and alive, since otherwise they may be poisonous. The shells of a live clam or mussel are firmly shut while dead ones gape open. Some red or green algae (dulce or sea-lettuce) may also be collected on the beach at low tide and may be eaten raw.

LAND ANIMALS:

Big Game: When big game such as moose, caribou, or musk-oxen are plentiful even an inexperienced white man equipped wirh a rifle can procure food. Unfortunately, big game is not always plentiful and in many places small game is more abundant and can be more easily obtained.

CARIBOU: are grazing animals and are widely distributed in arctic and sub-arctic countries. The barren ground caribou is absent in East Greenland, but is found on the west coast of Greenland from lat. 62° to 72° N. It is not abundant however and is nearly always found at some distance from coast. In Baffin Island it is scarce along the east coast but tolerably common in the interior and on the west coast. In Ungava caribou are not abundant but are found in limited numbers in the northern parts. In the Arctic Islands caribou are found in some of the larger islands but they are not plentiful. By far the largest herds

are met on the great interior plains between Hudson Bay and the MacKenzie River. In the Yukon and in Alaska caribou are generally restricted to the arctic coast or to alpine parts of the interior.

Caribou are nearly always found in herds. They are more or less migratory in habit and make seasonal migrations in quest of food. Thus, during winter the caribou wanders inland to places near the edge of the northern forest or to sheltered mountain valleys where caribou "moss" is available in abundance. In spring the herds move from the winter feeding grounds towards the coast. During the summer months the herds are generally to be found in the lowland or near the sea-shore where cucculent grass and herbage provide the food. During the height of the mosquito season caribou may be found near the sea-coast or, if in the far interior, on the highest and coolest mountain peaks, often near the snow line.

Caribou are most easily approached when in large numbers whereas singly or in small numbers they are watchful and less easily stalked. Their eyesight is poor but their sense of smell and hearing is very acute. For this reason the hunter should always stalk caribou against the wind. If no cover is available the hunter should avoid sudden or rapid movements because caribou are easily frightened. By approaching a herd slowly, taking a zig-zag course and making frequent stops, the hunter may be able to get very close. Caribou may be hunted with any kind of gun. In Greenland a .22 rifle is often used.

Woodland caribou are found sparingly across the continent from Labrador to Alaska; they are larger than the barren ground caribou, but never occur in large herds. Their favorite haunts are open or semi-barren places in the boreal foreast. In habit they are less migratory than the barren ground caribou.

Muskoxen are found only in northeast Greenland, in Ellesmere and the islands to the westward, and in North Devon. On the mainland small herds are found only in the Thelon Game Sanctuary and in a few places in northeastern parts of Keewatin district.

Of all large game animals the muskox is the easiest to hunt because, when attacked, the animals do not, as a rule, try to escape but take up a defensive stand, back to back. The killing of muskoxen is prohibited throughout the year, except in cases of dire need.

Brown or grizzly bears of several kinds are found on the barren grounds of the Mackenzie district east to Bathurst Inlet and along the coast, and in the mountains of Yukon Territory and Alaska. All brown bears hibernate and, as a rule, are not seen from October to May. During the summer they are most frequently seen in hilly country or along rivers, streams or lakes. In the autumn they are often found in places where berries are plentiful or near colonies of ground squirrels on which they feed. Brown or grizzly bears are not easily frightened and if approached against the wind the hunter may get fairly close. A wounded bear or a mother bear with young sometimes will attack man, but otherwise bears are harmless when not molested, and may be driven off by shooting or by the rattling of equipment. The flesh of young bears is very good; that of old animals may be tough, especially in the spring when the bears are in poor condition after their winter's sleep.

- Black Bears are forest animals. They are vegetarians, fish eaters, and scavengers and are most often found along rivers and streams. They are timid animals that are rarely known to have attacked man; when frightened they usually climb a tree.

Moose. The moose inhabits the bereal forest and may be found from Labrador to Alaska north to the tree-line or, occasionally, a short distance beyond the forest. Moose are browsing animals, feeding on twigs, and frequent the willow flats of river valleys and lake country or burnt-over country but are rarely, if ever, seen in coniferous forest. Because of its large size and excellent meat the moose is one of the most important big game animals of the North.

Mountain sheep are found only in the high mountains west of the Mackenzie River and in the mountains of the Yukon Territory and Alaska. Mountain sheep are wary and difficult to approach. Their eyesight, hearing and sense of smell are exceptionally keen and the hunter, to get within shot, must stalk his prey with extreme care. The best method is to get above the sheep. Sheep meat is very palatable

Small game: Small game is nearly always more abundant than large game and, what is important to a person marooned in the Arctic, is easier to hunt.

The Arctic hare is a good deal larger than a snowshoe rabbit. It is found from Greenland to Alaska and generally in low mountain country and in hilly rock-strewn places where the rocks and boulders provide shelter or cover. In summer it is found at high altitudes, often near the snow-line, while in winter it frequents lower country. It is a slow solitary animal except during the mating season when large numbers may be seen together. When approached from above the hunter is usually able to get very close.

Snowshoe rabbit inhabits the northern forest from Labrador to Alaska. Its numbers fluctuate greatly in more or less predetermined cycles of about ten years. Thus in peak years rabbits occur in incredible numbers while in other years they may be very scarce. When the snow is deep the rabbits make trails in the forest and are then easily caught in snares set in the trails. A rabbit snare is made from a two foot length of sted picture-wire, the end of which is fastend by a bit of string to a willow or to a suitable stick near a rabbit's trail in the snow. By means of a slip-knot a 4 inch noose is made which is placed vertically at right angle to, and above 8 inches above, the botton of the trail. A rabbit using the trail at night gets its head caught in the noose and is quickly strangled. Although the flesh is not very nourishing the rabbit is one of the important game animals of the northern Indians. Twisted strips of rabbit skin woven into a loose-mesh fabric, when covered with light cotton cloth for protection, make light and warm blankets. The skin of a rabbit makes an excellent fur sock.

The Perry ground squirrel is a small animal living in colonies in sandy and gravelly cutbanks and ridges in thebArctic barren grounds from Hudson Bay to Alaska. In such places the ground may be honeycombed by its burrows. It hibernates underground from September-October to May. During summer it is easily snared or shot. Its flesh is eaten by the Eskimo and is quite palatable, especially in late summer when the animals are fat.

The Porcupine may be found in the mountains of Yukon and Alaska and elsewhere in the northern forest but is never very common. It is very easily killed, even with a stick, andits flesh is fat and its flesh is fat and very nourishing. The porcupine often spends long periods in winter sometimes seeks shelter in rocky caves.

The Muskrat is not a rat; it lives in lakes and streams in the forested part of the north. It is most common in the deltas of large rivers, and generally avoids rodky country. In the summer it may be shot when swimming. In winter it builds "houses" on top of theice of lakes or burrows into the banks. The flesh is palatable and very nourishing.

The Beaver inhabits small streams, and lakes of the wooded country from Labrador to Alaska. The flesh, like that of the muskrat, is excellent and very nourishing.

Birds: During the summer numerous kinds of birds breed on the barren grounds and in the arctic islands. The most important food birds are ducks, geese and ptarmigan but other birds such as cranes, swans, loons, hawks and sea-gulls can be eaten as well. Birds eggs too can be eaten wherever found. During winter only a few species of birds remain in the Arctic. The most important is the ptarmigan, but in some districts snowy owls and ravens may be seen.

When fat the snowy owls are very good to eat. In winter the willow ptarmigan often frequents river banks and willow thickets to feed on the leaf-buds. In such places ptarmigan can easily be snared. Near the edge of the thicket and parallel to it a miniature fence is made by placing small willow sticks in the snow. Here and there openings or "doors" are left for the ptarmigan to go through. In the "doorways" slip-knot nooses 3 inches in diameter, made from thin steel or brass wire, are placed so that the ptarmigan will get its head caught in the noose. Once caught the bird quickly strangles. By this method large numbers of ptarmigan may be snared in one night in one willow thicket.

Generally speaking the northern coniferous forest is poor in game birds. The most common game bird here is the spruce grouse. Wherever found this bird is easily shot, or it may be snared like the ptarmigan. In summer lake country and small streams are more productive of bird life than is the forest.

FRESHWATER FISHES

Technique: To an inexperienced man left to his own resources in the arctic barren lands or in the northern forest freshwater fishes are of most importance as emergency food because fish can be caught in many places and with simple equipment. Gill nets provide the easiest and most efficient fishing gear. A 4½ inch mesh gill net 30-40 feet long weighs but a few pounds and in most places would provide plenty of food for a small party. The technique varies for the different kind of fish and with the locality.

Gill nets should never be used in swift water. In large river, nets should be set in quiet water above or below an eddy, while in a small stream it may sometimes be practical to set nets across the stream. In a lake, nets should be set at right angle to the shore, preferably off a point or headland where the water is deep close to the shore. Nets may also set near the entrance of a small creek or tributary.

A gill net used in open water should have floats along the upper edge, spaced at about 6 foot intervals and sinkers or weights along the bottom edge opposite the floats. The net, when set, should float suspended in the water from the floats. The outer end should be held in place by a larger float anchored to the bottom while the opposite end should be attached to some object on the shore. The net may be hauled in and out by a halyard fastened to the large float. If no boat is available a short net may be pushed out from the shore by the use of a long pole, or several long poles, lashed together end to end. Guy ropes to the end of the pole then hold the net in place. In wooded country a small raft may be used in place of a boat.

Fishing with a net can also be practiced in winter, in rivers and in lakes through the ice. When the ice is thick it is not very easy to set the net but when the ice is less than a foot thick it is not difficult.

First a straight row of holes are cut in the ice, spaced ten to twelve feet. Then a thin rope or halyard is passed under the ice by means of a long, slender pole used in the manner of a darning needle which is passed from hole to hole, floating up against the undersurface of the ice, by means of a forked stick. Each end of the net is then fastened to the line and by it is hauled into place under the ice. The rope is left permanently fastened to the net so that when the net is hauled out on the ice for inspection or removal of fish, the line temporarily takes its place under the ice.

The net is provided with floats and sinkers to make it stand vertically in the water. The sinkers should be heavy enough to insure that the floats are not resting against the undersurface of the ice because if they do they will soon freeze to the ice and and thereby prevent the removal of the net. The net is fastened to and lowered under the ice by a stick or pole at each end and by a short one from the center hole. This arrangement insures that no part of the net touches the ice and that the end lines are not accidentally cut when the holes are chopped open to inspect the net or to pull it out on the ice.

As a general rule lakes that have no vegetable growth on the botton are poor prospects for winter fishing.

In large lakes baited hooks may be set under the ice for lake trout The hook should be placed at a depth of 5-6 feet below the ice and not too far from the shore. In muddy places along river banks or on the shore of lakes, in places where small streams enter, ling or burbot may be caught under the ice in water but a few inches deep. This fish never bites except in the dark. In similar places, but in deeper water, pike, jackfish or inconnu may be taken on hooks during the day. When fishing in this way the line is fastened to s short stick held in the hand. The hook is moved by a slight vibration of the hand.

Trolling for lake trout or pike may be profitable in summer in large clear-water lakes. Few northern fish rise to a fly. One exception is the grayling or "bluefish"which inhabits clear mountain streams from Hudson Bay to Alaska. Lacking a "fly" grayling may be taken on a small barbed hook using a cranberry or some otherrred object for bait.

Fish weirs and fish traps may be used in shallow rapid streams for catching salmon or char.

Fish spears, or large hooks fastened to poles are successfully used by Eskimo in clear-water streams for catching the arctic char or sea-trout. This method is often used in conjunction with a weir or dam across the river.

Most important fishes. The lakes and rivers of the Arctic are inhabited by many different kinds of fishes. While all are species that are edible some are more important than others. The following are the most important.

Pike or jackfish is abundant in practically all waters of forested parts of Continental Canada. It is less common north of the tree-line and is absent in the Arctic Islands.

White fish. Several members of the white fish family are very abundant in lakes and rivers of the Mackenzie river basin as well as in other water systems rising in forested country. No white fish are known to occur in the Arctic Islands. White fish also may be taken in the sea near the mouth of the rivers.

Lake trout: in an important food fish which is common in most large lakes in the Yukon and throughout the Mackenzie and Keewatin districts. Large specimens may weigh 40 to 50 pounds.

Inconnu when fat is an excellent food fish. Large specimens weigh 50 pounds or more. It inhabits the larger rivers of the Mackenzie drainage system and may be taken in nets in summer or on hooks through the ice in winter. Notwithstanding its size the inconnu is not a sporting fish, and when caught gives no fight at all.

Arctic char or sea-trout inhabits arctic rivers on the mainland and rivers and lakes of the Arctic Islands. The char comes to the rivers to spawn and winters in some arctic lakes, but, otherwise, spends part of the year in salt water. It may be taken in nets in the sea near the mouth of rivers, or it may be speared or trapped in the rivers when on its way to the lakes to spawn. During winter it maybe hooked through the ice.

Ling or turbot, like the jackfish, is common in all streams and lakes in forested parts of Continectal Canada.

Graveling or "bluefish" is widely distributed in rapid clear-water streams from Alaska to Hudson Bay.

EDIBLE PLANTS

Introduction:

In a list of emergency foods in the arctic, edible plants are among the least important, partly because they are few and partly because in the Arctic plants are available for such a short time of the year.

It is no doubt significant that the northern Indian and the Eskimo obtain a very unimportant part of their food from the Vegetable Kingdom. There are, nevertheless, a score or so of arctic or boreal plants that have been found edible and palatable and that in an emergency may be used for food by air crews down in the Arctic.

Generally speaking no truly arctic plants are poisonous. There are no poisonous mushrooms or toadstools and no poisonous berries. In fact, north of the tree-line it is safe to eat any vegetable produce that appears ar all edible. In the northern forest, on the other hand, there are a few plants that are definitely poisonous. The ones most likely to be mistaken for edible species are the Death-Cup toadstool (Amanita Phalloides), and the fruit of the Red Baneberry. The following descriptions should be helpful in identifying some of the more important edible plants.

EDIBLE ROOTS

Licorice-root (Hedysarum borele)

Non-climbing perennial herb of the pea family with branching stems, 1 to 2 feet high, terminated by long racenes of showy pink flowers. The seed-pods are flat, net-veined, 1 to 2 inches long, and are joined together in several roundish sections. The root, which is edible, is a well-developed tap root, in mature plants attaining the thickness of a man's finger.

Licorice-root is widely distributed throughout northern Canada, and is found as far north as the shores of the Arctic ocean.

The root is mature in August and may be gathered in quantities with very little trouble until the ground freezes. In the spring before the new growth has started the roots are even better than in the autumn. During the summer the roots become tough and woody.

The root when cooked, in taste resembles that of young carrots, but is more nourishing.

This root during the early summer forms the principal food of the barren ground brown bears. Several species of meadow mice and lemmings in the autumn "harvest" the roots and place them "en cache" for the winter. The caches are found in subterranean runways near the surface. The Eskimo, with the aid of a dog, has no difficulty locating these "mouse" caches, and frequently obtains his own supply for the winter in this manner.

Woolly Lousewort. (Pedicularis lanata)

Perennial herb 5 to 8 inches high, with from one to several stems terminated by dense, white, woolly spikes of rose-colored flowers. The leaf is pinnate and looks somewhat like the frond of a fern; it forms a rosette at the base of the stem. Towards maturity the stems stretch and often protrude above the snow during winter.

The well-developed tap root is sulphur yellow. It is sweet like young carrots and may be eaten raw or cooked.

It flowers in June and is found in rather dry tundra throughout arctic Canada north of the limit of trees.

Polygonum Bistorta and P. viviparum.

Low, perennial herbs from 5 to 10 inches high; glabrous; with simple, solitary, or clustered stems from corn-like, somewhat scaly rootstock. Basal leaves oblong-lanceolate up to 8 inches long. Flowers white or pink in solitary, dense spikes.

The rootstock of these closely related species is edible. It is of the size of a pecan and is very rich in starch. It is slightly astringent when raw and is best when cooked.

Common in dry tundra, chiefly north of the limit of trees.

Silverweed. (Potentilla anerina)

A low, trailing perennial herb characteristic of gravelly, sandy and loamy sea-shores, lake shores and river banks. The leaves are feather-like, green above and silvery beneath; the flowers are yellow of the shape and size of strawberry flowers. The plant send s out long, trailing runners and forms thickened roots or fleshy, tuber-like branches that are edible, raw, cooked or roasted. The roots are best in early spring when they taste like sweet potato.

POT-HERBS AND GREENS

Wild Rhubarb. (Polygonum alpinum var. lapathifolium)

Freely branching perennial herb, 3 to 6 feet high, with thickened, sheath-covered joints. Stems reddish, bearing numerous pointed leaves 2 to 8 inches long with crisped edges. Flowers small and insignificant in large, plume-like panicles.

Prefers moist, alluvial, or open soil such as river banks and recent landslides where it may form pure stands of several acres.

It is very common in the Yukon, on the Mackenzie and its tributaries north to the limit of trees, but does not occur farther east.

The young, bright red, juicy stems that appear shortly after the snow disappears are edible and when cooked resemble rhubarb.

Mountain sorrel. (Oxyria digyna)

Low, smoewhat fleshy perennial herb with erect, simple stem. Leaves mostly basal, kidney-shaped in outline with 1-inch wide blades on long, slender stalks. Flowers small, red or green, in a terminal plume-like raceme.

The mountain sorrel is found throughout the barren grounds and on the higher mountains south of the limit of trees. It prefers somewhat shaded slopes and ravines where the snow accumulates during winter, providing moisture that lasts throughout the growing season.

The succulent, juicy leaves and stems are edible. When raw they are somewhat acid but very refreshing, when cooked their flavor and appearance resembles spinach. A very pleasant dish, resembling stewed rhubarb, may be prepared from the sweetened juice thickened with a small quantity of flour. Because of its habit of growth the fresh and green leaves of the mountain sorrel may be found throughout the summer.

Broad-leaved Willow Herb. (Epilobium latifolium)

Erect, glabrous, simple or branching, perennial herb from 6 to 12 inches high with willow-like, dark green, seasile, and fleshy leaves. Flowers purple, very large and showy in leafy racemes.

Abundant throughout the Arctic on sandy or gravelly soil such as river or creek beds where in many places large clumps are found.

The fleshy leaves are edible when cooked and in taste resemble spinach.

Dandelion

The young leaves of all dandelions may be eaten raw or cooked as pot herbs.

Scurvy Grass. (Cochlearia)

Annual or biennial, diffuse, branching, and somewhat fleshy herb. Lower leaves bright green, roundish or kidney-shaped in outline on short stalks. Flowers inconspicuous, white, in few-flowered racenes. Seed pods globular.

The scurvy grass grows abundantly along seashores, but is rarely found far inland. The plant when eaten raw as a salad or cooked is considered a valuable antiscorbutic.

ANTISCORBUTICS

An infusion made by the steeping, in boiling water, of the young twigs and leaves of spruce, hemlock, balsam, fir, or pine has long been known to be of great value as an antiscorbutic.

FRUITS

During late summer several kinds of small fruits and berries may be found in abundance in the Arctic. Without exception those found north of the limit of trees are edible and wholesome. Several kinds are undamaged by the frost and may be eaten in the spring when the snow disappears.

In the forested area the fruits and berries growing on trees or shrubs are all edible while those of non-woody plants, excepting the wild strawberry, should not be eaten.

MUSHROOMS

Many different kinds of edible mushrooms and puffballs occur throughout the North, and after a period of rain bushels of these fungi may be gathered almost anywhere. So far no poisonous species have ever been detected in the Northwest Territories. One poisonous toadstool (Amanita phalloides), however, has been reported from Athabaska Lake, and may also be expected in rich woods of the valleys of Slave, Liard, and upper Mackenzie rivers and in the Yukon.

In the forested area of the North it is, therefore, best to avoid mushrooms in the early or botton stage and to avoid any mushroom with a membrane-like cup or bowl or scaly bulb at the base above or half-buried in the ground. Also mushrooms in beginning decay should be avoided.

LICHENS

Of the various edible plants occurring in the North, the greatest food value perhaps is possessed by the lichens, in many cases erroneously referred to as "mosses".

Lichens are low, variously shaped, grey, brown, or black plants that in many parts of the North form an important element of flora. Botanically they are considered akin to the fungi, and like these have no true roots or leaves nor green chlorophyl or leaf-pigment. Three principal groups are recognized, based on their life-forms, known as shrub-like (fruticose), leaf-like (foliose) and crust-like (crustaceous) lichens.

None of the lichens occurring in the North is poisonous, but most of them contain an acid that is bitter and sometimes nauseous and may cause severe internal irritation if not first extracted by boiling or soaking in water. A very small quantity of soda or other alkali added to the water materially reduces this acid. Following the preliminary soaking the lichens are dried until brittle and then powdered, which may be done by rubbing between the palms of the hands or by pounding with a stone.

The powdered lichen if put to macerate in water overnight, when boiled jellies or becomes mucilaginous. It is best used with other foods. If mixed with a small quanity of flour a dough is formed, which may be baked into bread or biscuit, or made into soup.

Numerous species of lichen occur in great abundance in northern Canada, and several kinds are edible if treated in the way described above. Rock lichens, known by the "Voyageurs" as Tripe de Roche or Rock Tripe (Umbilicaria Mublenbergii, U. vellea, U. Hyperborea a.o.) are black or brown, leathery lichens which grow on the acid, Precambrian rocks only. Their irregular, saucer-shaped fronds are attached to the rocks by the center. When dry they are hard and brittle, but in damp weather become soft and cartilaginous and, when in this condition are easily collected.

The "Iceland moss (Cetraria islandica), and "Reindeer moss" (Cladonia rangiferina), are low, bushy, coral-like lichens that grow abundantly on the ground. The former is dark brown, its fronds are strap-like, ciliate on the edges. It grows in colonies in rather sandy soil and is common throughout northern Canada. Reindeer moss is a greyish, much branched, coral-like lichen. It prefers hollows or slopes where snow cover is assured during winter. It is very common throughout the North, and indeed often occurs in such large colonies that distant hills appear snow covered.

Lichens of all kinds are best collected when moist after rain. In some places it is possible to gather reindeer "moss" from under the snow.

BEVERAGE PLANTS:

Shrubby Cinquefoil (Potentilla fruticosa)

A low, much branched shrub with shreddy bark, large yellow flowers and numerous but rather small leaves each composed of from 5 to 7 silky, pubescent leaflets. The shrubby cinquefoil is common in muskeg swamps and in moist, rocky places north to the limit of trees from Labrador to Alaska.

The dried leaves may be used as a substitute for tea.

Labrador tea. (Ledum grenlandicum)

A low, much branched, strongly aromatic shrub with evergreen, leathery, canoe-shaped leaves covered below by a dense, brown felt; flowers white, strongly aromatic, in umbrella-shaped terminal clusters. Common in muskeg swamps north to the limit of trees, or beyond. The leaves may be gathered throughout the year and after drying may be used as a substitute for tea.

NATIVES.

Eskimo. Nearly all Eskimo tribes live on the seashore from East Greenland to the Bering Sea; of the larger islands to the north of the continent only Baffin, King William and Victoria Islands have more or less permanent Eskimo camps while others, such as Ellesmere, North Devon, and Banks Islands are sometimes visited by hunting parties. In their primitive stage Eskimo live almost exclusively on the flesh and fats of animals and depend to a very large extent on sea animals for food, clothing, and on their fats to produce oil for heat and light. Land animals are hunted when available, but only a few tribes depend entirely on animals. Before the advent of white man vegetable food played a very unimportant part in the diet of the Eskimo.

Most Eskimo tribes make seasonal migrations following the game; they have so highly developed a technique for catching the animals for the sea and in winter and summer, are skillful travellers on land and on sea. In lands poor in nearly all natural resources the Eskimo, by their ingenuity and skill, have managed to survive remarkably well. Some white men of the Arctic have been able to learn Eskimo methods and ways of living; but this done by no means easy, and requires the skillful handling of boats, kayaks, dog teams and many kinds of special hunting gear. Therefore, an inexperienced whiteman who is stranded or marooned in the Arctic should make every effort to do and find native camps of getting in touch with the natives.

The Eskimo are friendly and very intelligent people and when well treated are extremely helpful, hospitable and trustworthy. Practically all Eskimo now have had some contacts with white men and, with very few exceptions, they have all been converted to the Christian faith. In west Greenland and in some parts of Alaska the Eskimo have largely adopted the white man's way of living and have well ordered, more or less civilised communities.

The language of theEskimo is very difficult and a few white men can claim complete mastery. The dialects vary somewhat in the different tribes but so little that the Danish explorer Knud Rasmussen and the Greenlanders who accompanied him were able to talk to all the tribes they met on their journey from Greenland to Bering Sea. Today most Eskimo of Alaska and a number of those inhabiting arctic Canada understand some English many Greenlanders understand Danish.

INDIANS. All Indian tribes of northern Canada are forest people and even today seldom venture far into the Barren Countries. All are inland people and depend largely on land animals and fresh water fish. Indians are expert in woodcraft and by their often uncanny knowledge of the habits of the animals can obtain game or food where an inexperienced white man would starve. Even so, Indian tribes are sometimes unable to procure game and , in former times especially, famine was not uncommon.

Like the Eskimo the Indians of Canada through contacts with white men have adopted many of their customs and, when available, use considerable amounts of white men's food. In their primitive state the Northern Indian, as the Eskimo, lived almost exclusively on a diet of meat and fish. Indians appear less friendly and straightforward towards strangers, but when well treated they are friendly and helpful to anyone in need. The language of the Indians, like that of the Eskimo, is very difficult for a white man to learn. The dialects of the various Indian tribes differ so considerably from another that an Indian from one tribe rarely can understand the language of the more distant tribes.

In northern Canada a number of Indians understand some English or French.

SUMMARY

In the entire Arctic perimeter every small mammal that is found in the North American Arctic has its counterpart in European and USSR Arctic areas, and in many cases they are the same.

These are the important things to remember:

1. Stalk your game until close for a sure kill.
2. Survival on fishing is easier, with less expenditure of effort, than hunting.
3. Edible plants are only a supplement to a survival diet.
4. In order to survive for long periods it will be necessary for you to get between 40 and 50 pounds of edible meat per shell.
5. Native people who inhabit Arctic areas of the world will usually help you, but you must pull your weight. Native people in the Arctic are nomadic of necessity and their margin of food storage is always slim. Help them and they will help you.

1 MARCH 1950

LECTURE FOR INSTRUCTORS

BASIC SURVIVAL TRAINING

PROCEDURES FOR THE PRESERVATION OF MEAT

OF WILD ANIMALS, BIRDS, AND FISH

I. TITLE AND DURATION

a. Title - Procedures for the preservation of game and fish meat.

b. Duration - One-half ($\frac{1}{2}$) academic hour

II. OBJECTIVES

At the conclusion of this period the student should know:

a. Factors involved and items to be considered in the complete utilization of an animal carcass.

b. Requirements for the protection of meat from spoilage and predatory animals.

c. Utilization of game.

III. REFERENCES

a. Arctic Manual - V. Stefansson

b. Article by B. Browne

IV. TRAINING AIDS

a. Drawings and sketches by B. Browne

b. Diagram: No. 28, No. 14-A, 14-C, 27, No. 1

PRESENTATION

1. Introduction

a. Survivors in wild country must know how to exploit to their advantage the meat of game and fish and how this can be accomplished with the least effort and physical exertion. During the expansion of our frontiers, many men died from starvation, because they had failed to take full advantage of a game carcass simply because they abandoned the carcass on the mistaken theory that they could secure more game whenever needed.

b. The problems to be faced depend on six factors:

(1) Weight of the meat,

(2) Number of men in the party,

(3) Time to be consumed in reaching their base, with an ample time allowance for unexpected delays,

(4) Carrying capacity of the party.

(5) Amount of the existing food supply in the form of emergency rations and

(6) The advisability of remaining by the carcass long enough to recuperate from hunger, fatigue or injury, or to benefit by utilizing parts of the animal which cannot be carried away.

2. Transportation of meat after the kill.

a. If the animal killed is large, white men usually begin operations by packing the meat to camp. Indians usually pack their camp TO the animal so more of the meat can be utilized. A party traveling light, would profit by following the Indian method.

b. Dragging or rolling animal to camp. A procedure advocated in lectures and survival pamphlets is use of a big game animal's skin as a sled for dragging the meat to camp. It must be made plain that this procedure may prove satisfactory only on frozen lakes, rivers, very smooth snow-covered terrain or -- in the case of seals -- on the polar ice floes - when the entire animal is dragged. In rough or brush-covered country however, employment of this method is generally most difficult -- if not impossible. Mountain sheep or other large mountain animals can frequently be dragged down a snow-filled gully to the base of the mountain. Of course, where meat is the only consideration, mountain game can sometimes be rolled downhill for long distances. Once the bottom of the hill is reached, almost invariably the method is to either back-pack your meat to camp -- relaying the trips if no other survivors are present -- or, by following the Indian method of packing your CAMP TO the animal. Most white men are accustomed to hunt from a fixed base, so situated that only by boat, pack-train or road, can they transport game to civilization or to a point along their line of march. Under survival conditions, each man's total gear will weigh thirty (30) pounds at the most. In other words "your house is 'under your hat'." Obviously there is no reason to pack 100 pounds of meat to camp when you can pack a 30 pound outfit to the animal.

c. Procedure in extreme cases. If camp is on a river and you are rafting, you will pack your meat to the raft. In cases where the weight of the meat proves excessive, or it is not practical to move the base camp, following procedures should be followed:

(1) Eat at the scene of the kill the heart, liver, marrow bones and the kidneys. All of the meaty parts of the skull such as the brains, tongue, eyes and flesh should also be eaten at the scene of the kill. In a severe hunger emergency, the intestines, turned inside out, thoroughly cleaned in water, wrapped around a stick and roasted over coals, will be found palatable. The large intestine, cooked in this manner, is considered a delicacy by northern natives.

(2) Remove the bones from the meat. Leg bones laid on a bed of coals will roast quickly and can be easily cracked with light taps of a knife or stone to expose the marrow, which is highly prized as food by all hunters. This will decrease weight to be transported and you will be carrying only very essential meat.

3. Care of meat.

a. The capture of a wild animal should bring with it a feeling of responsibility. No hunter ever forgets the feeling of pride and exultation with which he approached his first buck, even though its meat may not have been a necessity But to men crossing a vast wilderness on a limited ration, wild meat means far more than it does to a sportsman. It means warmth, strength, and hope. In one word - SURVIVAL!

b. Skinning the animal. Butchering an animal under such conditions carries with it the obligation of doing a good job, utilizing every pound of meat. The first step in skinning is to turn the animal on its

back and with a sharp knife cut through the skin on a straight line, from the end of the tail bone to a point under its neck, A--C on the diagram. In making this cut, pass around the anus and, with great care, press the skin open until you can insert the first two fingers of the left hand between the skin and the membrane of paunch. When the fingers can be forced forward, place the blade of the knife between the fingers, blade up, with the knife held firmly in the right hand. As the fingers of the left hand, palm upward, are forced forward, the knife blade follows, cutting the skin, but not cutting the paunch. If the animal is a male, cut the skin parallel to, but not touching the penis. If the paunch or the tube leading from the bladder are accidentally cut, a messy job and unclean meat will result.

Figure 1.

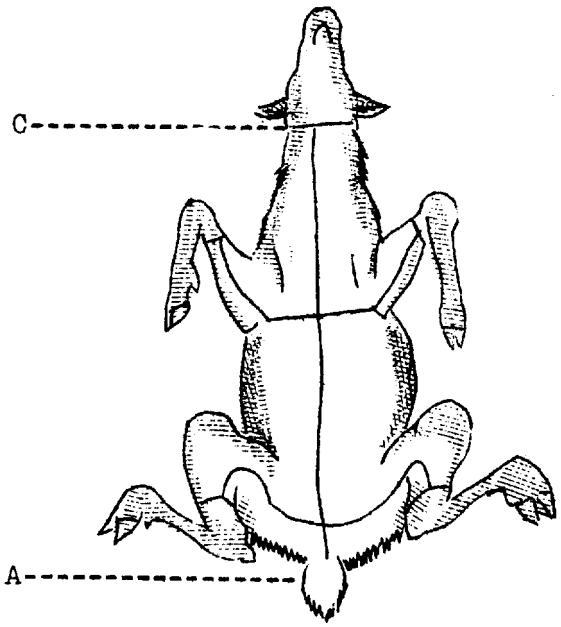


Figure 1 shows preliminary cuts made in skinning and butchering. On reaching the point where the ribs cover the paunch, it will no longer be possible to force the fingers forward, as the skin adheres more strongly to flesh and bone. Furthermore, care is no longer necessary. The cut to point C can be quickly completed by alternately forcing the knife under the skin and lifting it. With the central cut completed, side cuts are made, consisting of incisions through the skin, running from central cut A--C, up the back of each leg to the knee and hock joints. Cuts are now made around the fore legs just above the knee and around the hind legs above the hocks. The final cross cut is made at the point C where the skin is cut completely around the neck and back of the ears. Now is the time to begin skinning. On a small or medium size animal, one man can skin on each side. The easiest method is to begin at the corners where the cuts meet. When the animal is large, three men can skin at the same time. But remember that when it is getting dark and hands are cold, a sharp skinning knife can make a terrible wound. So, keep well away from the man next to you. When you have skinned down on the animal's side as far as you can, roll the carcass on its side to continue on to the back. Before doing so, spread out the loose skin on the down sider to prevent the meat from touching the ground and picking up sand and dirt. Follow the same procedure on the opposite side, and the skin is free. If you decide before skinning that you do not want the skin, a rough job can be done. But, in wild country, think well before throwing it away. A square of skin, long enough to reach from your head to your knees will weight next to nothing when green dried, and is one of the best non-conductors to use under your sleeping bag on

frozen ground or snow. Snow will not stick to the skin if you lay it hair side up.

c. Butchering

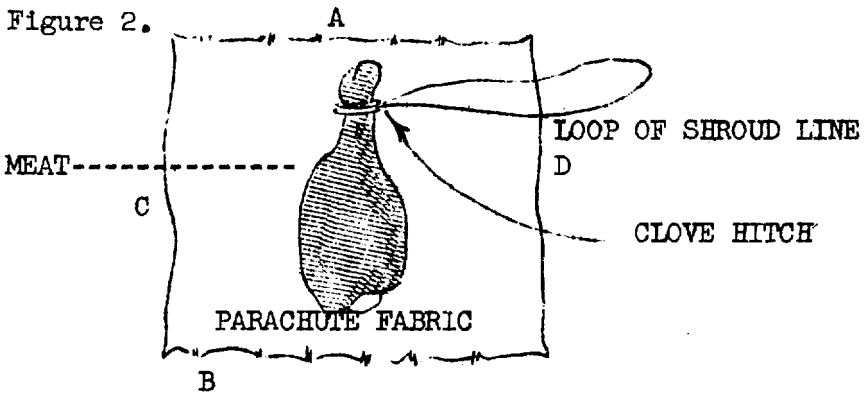
(1) Immediately after a kill is the best time to skin and butcher. However, if you kill an animal late in the day you can make the preliminary cut, A--C, gut the animal and return early next morning to do the skinning. The smell of man about a newly-killed carcass is usually sufficient to protect the kill against predatory animals overnight. However, if visited, the marauder will usually eat only the guts. In opening the paunch, follow the same procedure you followed in cutting the skin; using the fingers of the left hand as a guard for the knife and to separate the intestines from the paunch covering. You can cut away this thin membrane along the ribs and sides in order to see better. Care must be used to avoid cutting the intestines or bladder. The large intestine passes through an aperture in the pelvis. This tube must be separated with a knife from the bone surrounding it and a knot should be tied in the bladder tube to prevent the escape of urine. With these steps accomplished, the insides can be easily disengaged from the back and removed from the carcass. A well-conditioned animal's intestines will be covered with a lace-like layer of fat, which can be lifted off and placed on nearby bushes to

dry for later use. The kidneys are embedded in the back, forward of the pelvis, and are covered with fat. Running forward from the kidneys on each side of the back bone are two long strips of chop-meat called "back-strap," which can be cut out. This is eaten after the liver, heart and kidneys as it is usually very tender (tenderloin). An old hunter's trick which pays dividends in cold weather is to build a fire, if circumstances permit, and gut the animal before skinning. Then remove the kidneys, cut into slices about one-half ($\frac{1}{2}$) inch thick, skewer them on green sticks and prop them over the fire. Skinning can be a long, hard job, and it is invigorating to sit by the fire, eat toasted kidneys and have a smoke before heading for camp. More complicated methods are followed by sportsmen and scientists in the preparation and preservation of skins, but the simple method just described will meet every requirement in emergency procedure.

(2) Protection from flies. The greatest danger to meat is during weather warm enough to allow flies to deposit their eggs on, or "blow" the meat. Even while you are skinning an animal, flies can enter bullet holes or any small cavity and lay eggs, which turn into maggots in a few days. Only when the temperature is below freezing is there safety from this pest. At all other times, the

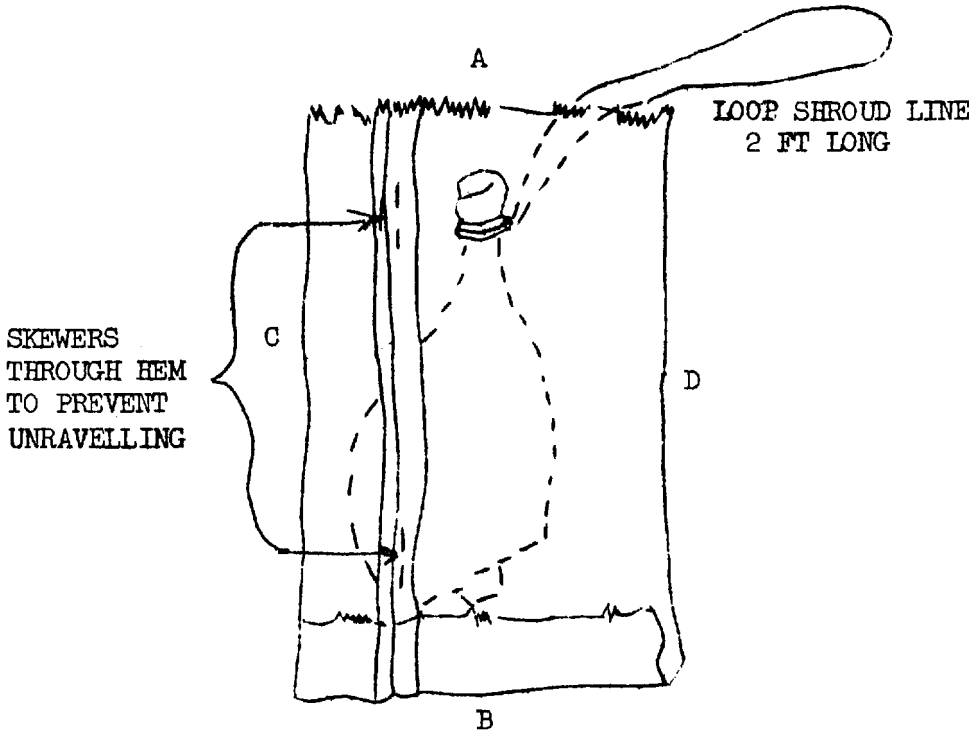
only way of preventing fly blow, is to make it impossible for a fly to touch the meat. By exercising a little ingenuity, patience and care this can be accomplished. It is an accepted fact that when a forced landing is made, and the crew is faced with the necessity of making a long journey across wild country, parachutes and shrouds are among the most important items to retain. Complete details of the many uses of parachute material in survival procedure will be found in several Air Force pamphlets. One of its most important uses, apart from providing shelters, is in the protection of meat. As the meat is removed from the carcass each separate piece should be laid on a square of parachute fabric, carefully examined to insure cleanliness and then protected in the manner which we will describe and illustrate.

Figure 2.



Secure a loop of shroud line around small portion of cut. The sides C and D are now brought together and rolled to form an insect-proof hem. The hem must not be rolled tightly against the meat, but loosely, so that an air space of an inch or two is formed between the meat and the sack, as shown in Figure 3, below.

Figure 3.



Small skewers of wire or sharpened wood are forced lengthwise through the hem to keep it from unrolling. The bottom of the bag at B is now turned upward as shown and rolled from both ends into a tight roll and strongly lashed with shroud lines. You now have an insect-proof bag with the exception of the top. If you are packing the meat to camp,

or while you are preparing a tree or scaffold on which to hang the meat, you can push the shroud loop inside the bag and fold, roll and tie the upper end "A" as you did the bottom. When you hang the meat however, unlash the top, AND HANG THE MEAT FROM THE SHROUD LOOP. This will remove all strain from the fabric bag and allow it to hang loosely and move in the wind without touching the meat. When the meat is hanging, adjust the bag so that the bottom of the bag does not touch the meat. By using care, you can make the top insect proof without tying it, thus facilitating removal of the bag. This is done by rolling the upper end of the bag around the two cords from which the meat hangs until only four or five inches of the top remain. Take this remaining fabric, force it between the two suspending cords and pull down on it firmly. This will seal the fabric securely and will allow access to the meat with minimum trouble. While hanging meat in a tree is satisfactory, it is more easily shaded from the sun when hung from a pole, for it can be covered with a fabric tarp which also will protect the meat from the rain. In suspending meat from a pole, pass the end of the loop of the shroud line over the pole, press loop around standing part and push a small stick through the space thus formed between the loop and standing part. If no poles are available, hang the meat on a

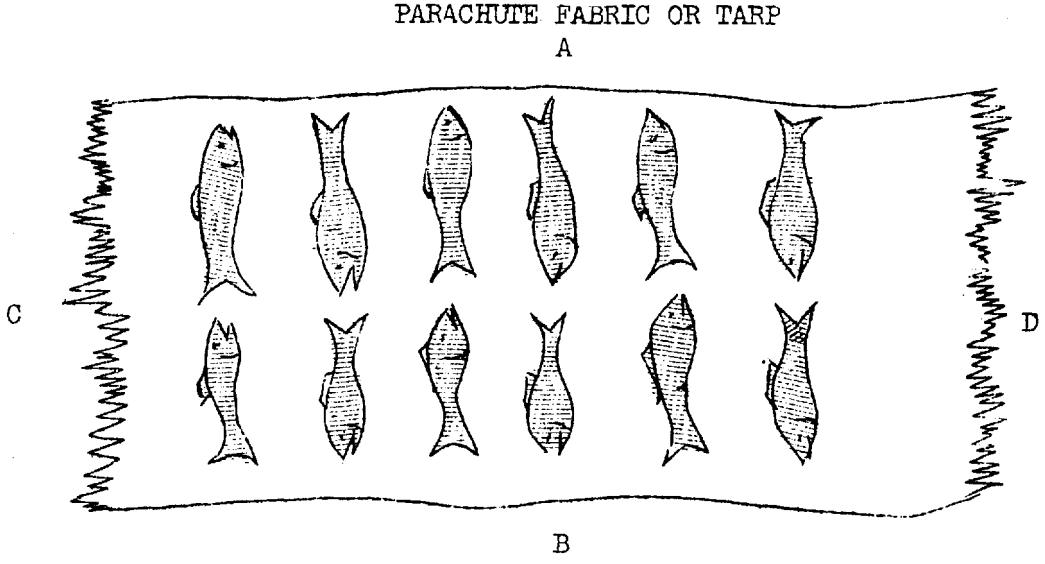
rope, stretched over large boulders. But, whatever method is followed, it is of the utmost importance that the sacks be removed at night in order that the meat may be coiled by the night air. Neat sacks should be kept dry.

(3) Packing meat on the trail. When meat is to be back-packed during the day it should, as always, be sacked before flies have begun their activities. Sacks should then be apportioned to each individual in the party on the basis of his ability and the amount of expedition equipment he is carrying. The separate loads of meat should then be rolled in fabric or clothing which each man can supply -- such as a sleeping bag or parachute fabric -- and placed inside the pack to be carried. This soft material will act as a nonconductor in keeping the meat cool. In the fall, when mountain hunters are leaving a high camp returning to the warm lowlands, meat frequently freezes or frosts. In preparing it for transportation on horses, it is folded and wrapped in "pack mantos" or tarps and loaded as side packs on each side of the horse. Despite the fact that the meat may travel for a day or two against the sweating sides of a horse and in valley temperatures that may reach 70 degrees, it frequently happens that, when unpacked, the meat is still frozen. This is caused by the nonconducting action of the layers of canvas. Meat cared for in this manner will

within a few days, depending on weather and circumstances, form a hard dry skin or cured meat that will protect the innermost flesh for a considerable period of time. In sparsely-settled regions, native dogs will smell meat at incredible distances and raid the meat cache at night. Great care must be taken to guard meat from dogs and other predatory animals.

(4) Preservation of Fish. The principle just described may be used to preserve fish through several days of warm weather. The method used is similar to that used with meat.

Figure 4.



Where there is no danger of predatory animals disturbing the fish, in the evening when flies have stopped "working" lay the fish on the available fabric as shown in the diagram. Allow fish to cool all night. Early

the next morning, before the air gets warm and flies appear. turn down the upper edge of the tarp over the top line of fish and turn up the lower edge, "B," over the lower line. Then begin on the edge of the tarp, "C," and roll the tarp around the fish -- in such a manner that each fish is completely enfolded with fabric -- until you reach the edge, "D." Then, fold the roll thus formed in the center. You will have a rounded roll of protected fish. This roll should be securely tied -- not too tightly -- and wrapped in a sleeping bad, parachute fabric or clothing as you would do with the meat. The bundle thus formed should be placed inside your pack. During rest periods, or whenever the pack is removed, place it in the shade if possible, to protect it from the direct rays of the sun. If the presence of predatory animals is suspected, suspend the fish from a pole or tree. Cover the package if rain threatens.

(5) Smoking Meat or Fish. In warm or damp weather -- when meat deteriorates rapidly -- smoking from a low fire can for some time prevent its spoiling. Care must be taken to keep the meat from getting too hot. Cutting the meat across the grain in thin strips and either drying it in the wind or smoke will produce "jerky," one of the staple foods of the pioneers. Fish should be flattened by removing the back bone and skewering in that position

before smoking. Thin willow branches with the bark removed make good skewers. Willow, alders, cottonwood, birch and dwarf birch make the best smoking woods and are found throughout the arctic and subarctic regions. Pitch woods, such as fir and pine should not be used as they cause smoke. In enemy country smoke is dangerous. But places where a flame cannot be seen, such as a dry dry stream bed with high banks, can be found. At night, smoke cannot be seen from any great distance. Indians frequently used tepees as smoke houses -- and a Para-tepee is a natural for this purpose. By tying meat to the upper ends of the poles and closing the smoke-flaps, a good concentration of smoke is obtained. Efficient smoking also can be done by stretching a tarp over a drying rack and building the fire underneath.

(6) Rationing. Under emergency conditions, men will get so hungry that it becomes difficult to resist the desire to eat between meals and consume large quantities of food. The leader of the party should take charge of the distribution of the meat and ascertain that his companions share equally. An old custom under such conditions is for one man to cut the meat. The separate portions are then drawn for by lot and the meat cutter gets the last piece. This procedure rarely if ever produces criticism.

(7) Carrying Distance of Sound of Rifle Shots. The distance

that a rifle shot can be heard varies tremendously with conditions of wind and humidity. In sub-zero weather, when there is no wind, a rifle shot can be heard for ten miles or more. In a heavy wind, the report of a gun is quickly dissipated. In enemy-held territory, great care should be taken to prevent the sound of a rifle shot from reaching unfriendly ears. In some cases, snaring and fishing will be the best methods to employ rather than risk the danger of gunfire. (Methods of snaring and fishing will be found in a separate article.) The universal method of calling for help is the firing of three, equally-spaced shots. About ten seconds is the best interval to use, for in shooting at an animal, such equal timing rarely occurs. When a traveling party is separated, all members should converge on the sound of a shot.

(8) Palatability of Meat. Stefansson in his "Arctic Manual, Animals Preferred by White Man," states under the heading "Palatability," "The usual view of northern meat eaters is that caribou is the best land animal and the seal best at sea. White newcomers are likely to prefer the musk ox. This is because it is practically identical with beef .....In certain parts of the Arctic and in larger areas of the sub-Arctic, moose, mountain sheep and other mammals are added to this list and seals and

musk ox are withdrawn. Here the preference of the average white man would run as follows:

First, Mountain Sheep, although it is not frequently available; Secondly, Moose, because it resembles beef and, Lastly, caribou." Stefansson states that the meat of the polar bear is more easily chewed when frozen raw than when cooked. This applies to other wild meats, but the fact that polar bear has recently been found to carry trichinosis is sufficient warning to require the careful cooking of its meat. His studies indicate that a few, but not all, polar bear livers produce sickness in man. Stefansson says, relative to seals, "that there is little preference between parts. Most people like the liver boiled, or frozen and raw. The heart is liked and the kidneys. Practically all parts of the body, except the entrails are much on a level."

Relating to the most palatable parts of wild animals; Stefansson continues, "The best (meat) is the head, next comes brisket, ribs, backbone and pelvis. The hams are considered the poorest and among northern natives, are frequently fed to dogs. At first, white men are inclined to consider the hams best, particularly so if they possess a store of white man's food, for steaks cut from the hams resemble the meat they are accustomed to."

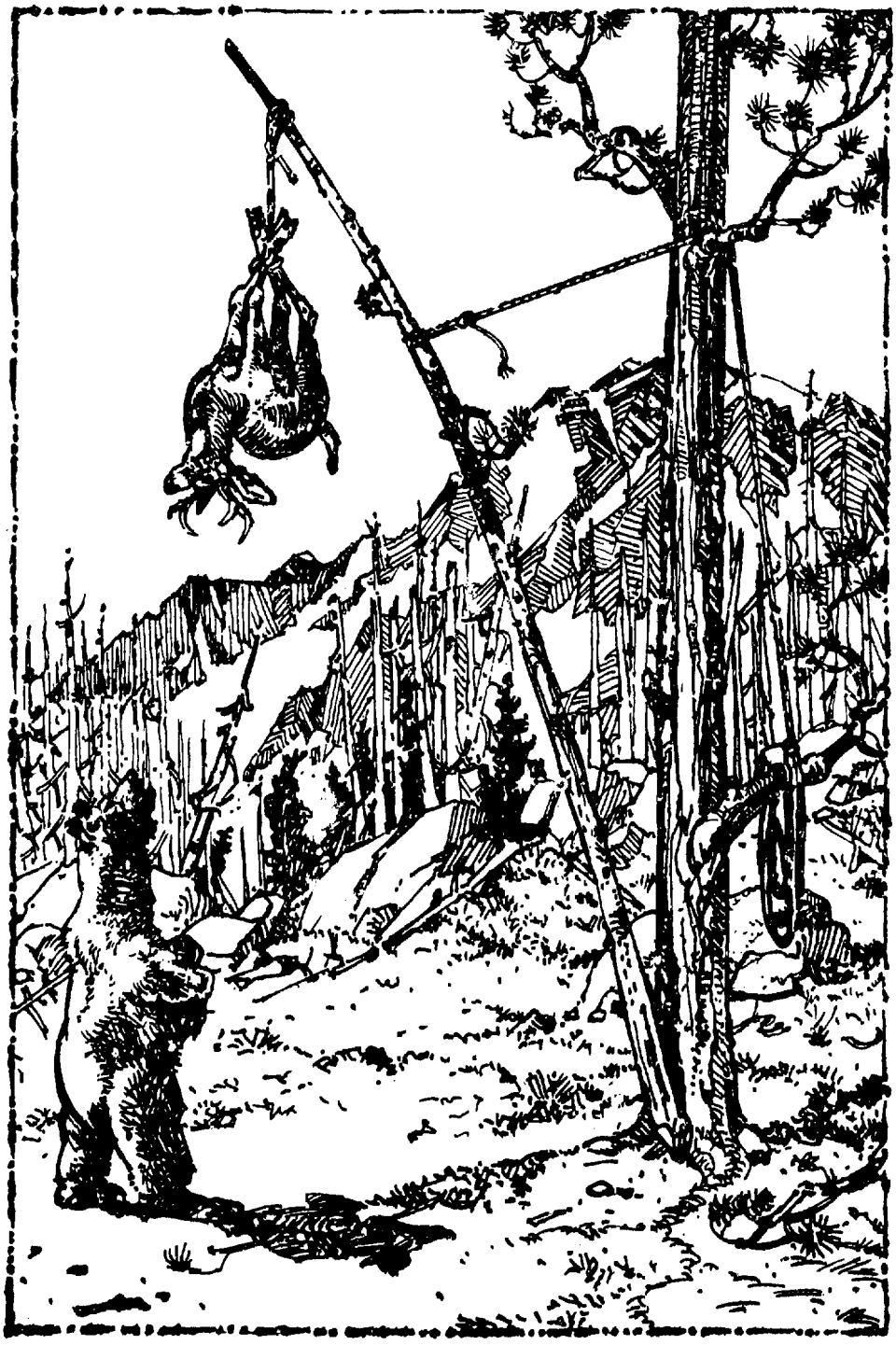
(9) Birds should be treated in the same manner as meat. They should be "drawn" soon after killing and protected from

flies. Birds that carry no fat, such as the ptarmigan, crows, owls, etc., may be skinned, but the skins of waterfowl are usually fat and for this reason these birds, should be plucked and cooked with the skin on. The giblets should be eaten when food is scarce.

(10) Living on Meat. As many white men, faced with the need of living on a straight meat diet might consider themselves in danger, it is wise to consider carefully Stefansson's statement in this respect. The explorer writes, "Meat is only a complete diet when the animal you eat is fat." Many white men entertain the idea that they are unable to eat fat. This is accounted for by the fact that in a plentiful, civilized diet, fat meat is not a necessity. Under emergency conditions however, when sugar or vegetable oils are lacking, fat must be eaten. Rabbits lack fat, and the fact that a man will die on a rabbit diet illustrates the paramount importance of fat in a primitive diet. The same is true of fats of birds such as the ptarmigan. In Stefansson's words, "It would appear that a diet consisting exclusively of fat meat is a complete diet, even when bones are not chewed -- that it contains all the stuff necessary for health, including calcium and all the vitamins." In summation, it cannot be stressed too strongly that the procedures we have outlined are the result of careful study and evaluation of methods actually used by natives of

wilderness or sub arctic areas. The only difficulty in employing these methods will be the indoctrination to a most primitive mode of living. This transition will be given to you here in a manner as nearly approximating actual conditions as climate and terrain will allow. Upon completion of this course, you will have a thorough concept of the elementary - - but vital - - principles essential to SURVIVAL.

SINGLE POLE CACHE



USED BY HUNTERS, TRAPPERS AND PROSPECTORS FOR OVER-NIGHT PROTECTION OF MEAT OR SMALL FOOD UNITS.

SUSPENSION CACHE

WILL HANG A LONG TIME

LECTURE FOR INSTRUCTORS
BASIC SURVIVAL TRAINING

WATER

I. TITLE AND DURATION

a. Title: Water

b. Duration: One (1) academic hour.

II. OBJECTIVES

At the conclusion of this period the student should know:

a. The importance of water to a survivor.

b. Where and how to find drinking water in all kinds of terrain.

c. How to make use of water from plants.

d. How to clarify and purify water.

e. Dangers of Drinking Impure Water.

III. REFERENCES

a. How to survive on Land and Sea-Naval Institute publication.

IV. TRAINING AIDS

a. Photographs and drawings in reference a.

PRESENTATION:

1. Introduction:

a. Water is the most important single factor in determining survival. Without it, the presence or absence of food is of little importance. You can survive many days without food if you have water. Under average conditions an individual needs at least a quart of water a day, but the amount essential under widely varying conditions of weather, climate and surroundings may be a great deal more or less. A man who knows how to use water intelligently may come through in reasonably good condition with a supply on which another man might die of thirst.

b. If you are extremely thirsty, sip slowly and don't take an excessive amount of water. Likewise, if you are hot from the sun or from exercise, avoid drinking cold water, or an excessive amount of water. If only cold water, snow, or ice is available, warm it in the mouth before swallowing.

c. If water is scarce, and you are exercising, you will lose less through sweating if you drink a small amount at fairly frequent intervals than by taking a lot at a time. However, when the body is dehydrated there seems to be little difference.

2. FINDING WATER

a. The water table is the surface below which the rocks of the earth are saturated with water. Its level tends to follow the contours of the land surface, rising somewhat beneath hills, and in some places intersecting the surface to form springs and seepage areas or to merge with streams, swamps, lakes and oceans. Water lying below the water table is termed ground water and in general is pure. Water lying above

the table is runoff water and is much more likely to be contaminated. Water is an excellent germ-carrier and is almost always polluted near human habitations, particularly in the tropics. In inhabited areas it should be boiled. Streams, rivers and lakes usually are supplied by both ground and runoff water. Water from large lakes is generally safe if taken some distance from human habitation.

b. While running water tends to purify itself, it is not necessarily pure, nor is still water necessarily impure. A stagnant hole in the wilderness far from human habitation may be safe for drinking, and a running stream near a native village extremely dangerous. Water in swamps, bogs, and in pockets on the forest floor may be acid and dark from decaying vegetation, but it is not impure unless there is some outside source of pollution. Of course it should always be purified if it is near any human habitation. A spring issuing from a rock usually is safe. Rain water is pure. (When looking for water remember that the water table is usually close to the surface and can be reached with little digging in low forested areas, along the seashore, and in the flood plains of large rivers.)

3. ALONG THE SEASHORE

a. Rain water absorbed by the ground gradually seeps seaward, meeting the salt water at the shore. Drinking water usually can be obtained along the seashore by scooping out holes in the beach at low tide, or by digging a shallow well some distance from shore. Water obtained away from the shore is generally fresher, but more labor is required in getting it. The best spot for digging is in a low basin where drainage from the land is concentrated. Fresh water will be found first when you dig since it is lighter than salt water.

b. Water from any hole dug near the sea is apt to be brackish, but is safe to drink as it is found. Water too brackish to drink frequently can be made palatable by running it through a sand filter several times. Brackish water, although salty in taste, doesn't have a high enough salt concentration to be harmful. Drinking sea water in any quantity when the body is dehydrated is extremely dangerous. The concentration of sodium and magnesium salts in it is so high that fluid must be drawn from the body to eliminate the salts, and eventually the kidneys cease to function.

4. DESERT OR ARID LANDS

a. In all arid parts of the world there are numerous indicators of the presence of water. These include converging game trails, the presence and direction of flight of some birds, and the presence of certain plants. Pigeons or parrots are always within reach of water. They may feed in the desert, but they will fly to water in the late morning and late afternoon. Water can be found by following their direction of flight. This rule may be of use in places as widely separated as our own Southwest, and in desert regions of Asia. The sand grouse of arid parts of Asia are pigeonlike birds that fly many miles to congregate at water holes, for they must drink at least once a day. Crested larks and desert species of weaver birds and coursers may fly regularly to nearby water in the evening. Many desert bats visit water regularly at the beginning of their evening flight.

b. Some plants grow only where ground water is close to the surface. Salt grass, rushes, sedges, cattails, greasewood, willows and elderberry are examples which you may be familiar. Desert palms usually indicate surface water. In dry regions, dig for water where vegetation

appears to be greener or larger or markedly different from surrounding types, or where the sand is damp in dry river beds or other low areas. Brackish desert water should be filtered using soil a foot or so below the surface. The surface soil may itself be saturated with salts.

c. Dew can be collected in useful quantities during a clear night. Go abroad before daylight and gather it in a cup by tapping vegetation, or sponge it up with a handful of soft grass or cloth.

d. As a last resort, water may be obtained by breaking off a young desert tree at the base, and then removing the top. Turn the broken trunk upside down, and collect water from the drippings.

5. MOUNTAINS.

a. On a clear day, mountain snow can be melted by placing a shallow container on a sunny exposure out of the wind. Apparently dry mountain stream beds often will contain water beneath the gravel stream bottom. Put ear to the ground and listen for the trickle.

6. FINDING WATER IN COLD WEATHER.

a. In cold weather, springs and spring-fed streams remain open when other water courses are frozen. Water can be obtained by cutting through the ice of a stream or lake. To obtain water by melting, use fresh ice or granular snow in preference to new spongy snow, as a smaller bulk will make more water and take less fuel and time. Eating snow and ice will quench thirst, but tends to chill the stomach and reduce body temperature. A water problem does not exist in Tundra country, since it can be had over vast areas simply by digging a hole to permafrost level and waiting for it to fill up.

b. In the Arctic sea the most available water source is old Salt-water ice, which can be distinguished from Salt-ice by its bluish color and smooth, rounded corners. (Salt ice is grey and milky) Gradually the tip of salt water ice approaches the composition of Fresh Water Ice.

c. Brine oozes from cavities in the ice into the water and therefore, the older the ice, the less the salt that remains in it. The salt content of blocks piled up by pressure onto the surface of ice decreases to such an extent that in one year they are almost fresh. In summer, depressions on icebergs and floes contain fresh water from this melting ice. In bays with small tides and inlets protected from wind and current, melt water from snow and ice from the land and old ice melting in the bays accumulates on the surface of the denser salt water and may remain fresh and unmixed with ocean water for long periods. In general this water is available from July to the end of August. It is a good idea to test all shore ice for solinity.

7. WATER FROM PLANTS.

a. Sap is chiefly water and from many plants it is both fit to drink and readily available. In an emergency, a water-yielding plant may save your life or save valuable time by eliminating the necessity of purifying water from questionable sources. The fruits, growing tips, leaves, stems and buds of many plants contain small quantities of water.

8. WATER FROM SUCCULENT PLANT TISSUES.

a. Many desert and other plants store water in their fleshy leaves or stems. In an emergency, such sources should be tried anywhere you happen to be. The barrel cactus of the southwestern United States is well known as a source of water. Cut off the top of the plant, mash the pulp

within against the inner sides, and the water will ooze out and collect in the bowl. The fruits and roasted pads or stems of very young prickly pears taste somewhat like asparagus and will help quench thirst.

9. WATER FROM THE ROOTS OF DESERT PLANTS.

a. Water may be obtained from the roots of some desert plants that have their roots near the surface. Drain each section into a container, or suck out the water. One large root usually will supply the water needs of two or three thirsty men. Trees growing in hollows between ridges will have the most water, and roots one to two inches thick are ideal in size. Water can be carried in these roots by plugging one end with clay. Water from the roots of all water producing plants is obtained in a similar manner to that described above.

10. WATER FROM VINES, STEMS, AND FRUITS.

a. Vines. Many large vines or lianas found in tropic ran forests contain a pure watery sap with a slightly acid flavor. Since not all of them will yield water, and the fluid from some is more palatable than others, it will be desirable for you to experiment with various species. Try any grapevine. The method of tapping them is the same for all. Reach as high as you can and cut a deep notch in the vine or cut it off, keeping the severed and elevated. Then cut the vine close to the ground; this should give you a water tube six to seven feet long. When water stops dripping from the lower end, cut an other section off the top and more water will drain out. If the bottom of the vine is cut first, part or all of the water will be lost, as

the water will ascend. (Grape vines found in the United States will yield water in this manner in the summer fall)

b. Many species of rattan palms produce good drinking water. They are vinelike palms with long, slender, segmented stems and sharp, downward curving thons, and are widespread in tropical jungles and virgin forests.

c. Palms. A drinkable sugary sap can be obtained in quantities from the buri, nips, coconut, sugar and other palms. To start coconut sap flowing, bend the flower stalk downward and cut off the tip. Every 12 to 24 hours cut off a thin slice to renew the flow, which may reach a quart or more daily. The flow of sap can also be started by first bruising a lower frond and then pulling it down so the tree will "bleed" at the injury. The sap will run down the trough-like frond and can easily be collected.

d. On any one coconut palm, the nuts will be in varying stages of maturity. Contrary to your usually experience, the green nuts are the best. They are more easily opened with a knife or machete, have more fluid, and the fluid can be taken in quantity without harmful effects. The delicious juice of the ripened coconut will act as a mild physic if taken in quantities of more than three or four cups daily. To get to the edible part of a coconut, slice off the stemless end of the outer husk to form a point, then cut off the point so as to sever the end of the inside shell. To husk a coconut without a knife, drive it on a sharp stick stuck in the ground, then crack the hard inner shell.

e. Banana and bamboo. The slightly astringent water from the trunk of young banana trees is suitable for drinking. Water also can be obtained from the stems of some bamboos. (Shake them to see if water is inside.)

11. PLANTS THAT CATCH AND HOLD WATER

a. Many plants catch and store rain water in natural receptacles or decayed hollows. The air plants which affix themselves to jungle trees are good water reservoirs. Leaves of the pineapple-like Bromeliads in particular form regular basins which catch and hold several pints of rain water.

12. MUDDY, STAGNANT AND POLLUTED WATER

a. It is often necessary to use muddy, stagnant, or polluted water. Water polluted by mud or animals is unpleasant but harmless if it is boiled. Muddy water can be partially cleared by allowing it to stand overnight. It can be cleared more quickly, however, by passing it through a filter such as a sand-filled cloth, a length of bamboo filled with sand and clogged with grass or clothing to keep the sand in, or by using a grass or reed cone. For the later, tie a handful of grass in the shape of a cone, six to eight inches long. Dip the cone into the puddle, then flick it upward and out. Water will trickle down through the small end of the cone.

b. Split cactus or Opuntia stems or "pads" placed in muddy water tend to clear it by gathering much of the sediment on their gelantinous tissues. (The best method of water clarification is by the

use of ammonium alum, which forms a precipitate and settles to the bottom.) Water with a disagreeable odor should be boiled and the odor neutralized by adding charcoal and ash from the fire. Water that has merely had the sediment cleared out of it is not purified. To be safe it must be boiled at least three minutes or longer. Halazone tablets, or three or four drops of iodine to a quart of water will help to purify unboiled water. Let it stand for a half hour before drinking. If there is a slight chlorine smell, the water is safe to drink.

13. DANGERS OF DRINKING IMPURE WATER

a. Don't try to short-cut on water purification. Waterborne diseases are one of the worst hazards of tropical and subtropical countries, particularly where there are native populations. An "untouched" wilderness is relatively safe. If you boil or chemically purify all drinking water thoroughly you will reduce greatly the dangers of contracting dysentery, cholera, typhoid fever and some of the parasitic infections.

14. DYSENTERY

a. Dysentery is the most common of the water-borne diseases. The most noticeable symptoms of both the amoeic and baciliary dysentery are severe and persistent diarrhea accompanied by mucus and blood mixed with the stools. There is fever and general weakness. If drugs are available, first try bismuth submitrate (one teaspoon every few hours in a little water until disturbance stops.) If this does not help, take 1 capsule of carbosone (0.25 gm.) after each meal for five days and see a doctor as soon as possible.

15. CHOLERA AND TYPHOID

a. You will be given inoculations as a preventive against contracting these two diseases, but nevertheless don't take chances when they are prevalent.

16. FLUKES AND WORMS

a. Blood flukes that parasitize man and cause painful and often fatal diseases can be picked up through drinking sluggish, contaminated water in tropical regions. Some small crustaceans act as intermediate hosts to human parasites such as the guinea worm, and are swallowed in drinking water. The guinea worm larvae penetrate the walls of the intestines and migrate through the tissues, lodging finally just beneath the skin. They produce blister-like lesions on the lower extremities through which the young worms are discharged. If the victim submerges himself in water, the worm protrudes its tail to eject eggs or larvae. Then it can be pinched and cautiously drawn out. Guinea worm disease is found in large areas of Africa, India, Persia, Turkestan, West Indies and Northern South America. Prophylaxis consists in drinking only boiled water.

17. LEECHES

a. In some areas, particularly in Africa, and India small leeches may be swallowed with the drinking water. They will attach themselves to the throat and nasal passages, sucking blood and creating wounds which will continue to bleed after the leeches shift to new positions. The leeches can be removed with forceps or by sniffing highly concentrated salt water.

b. The list of tropical diseases is impressive, but so is the list of those you might acquire at home if you didn't take normal precautions against them. You have been immunized against some of them, and can greatly reduce the chance of your getting any others by following recommended safety practices, and using medical facilities whenever they are available.

1 March 1950

LECTURE FOR INSTRUCTORS

BASIC SURVIVAL TRAINING

PERSONAL HYGIENE AND CAMP SANITATION

I TITLE AND DURATION Course BZE-17d

a. Title. PERSONAL HYGIENE AND CAMP SANITATION.

b. Duration. One-half (½) hour.

II OBJECTIVES

At the conclusion of this period the student should know:

a. The requirements for personal cleanliness, essential in survival.

b. The requirement for sanitary campsites and the most common violations encountered.

III REFERENCES

a. Arctic Manual - V. Stefansson.

b. Handbook for Boys.

c. Arctic Manual - TM 1-240.

IV TRAINING AIDS

a. None.

PRESENTATION

1. Introduction. Most of us have a tendency when relieved of civilized environment and the social requirements of civilization, to relax and show complete disregard in our daily cleanliness habits. But these requirements allow for no relaxation and are compulsory in arctic survival. The most important point to remember is that cleanliness is the key to personal comfort, health, and body warmth, and constitutes a definite requirement for the preservation of wearing properties of clothing. Camp sanitation while an important factor in survival, is conducive to high morale, good health, and discipline. A littered and dirty campsite indicates a lack of discipline, low morale, and that the tenants are in a low state of mind.

2. Personal Hygiene.

a. Beards. Beards are picturesque and do away with the necessity for washing the face, but have proven unsatisfactory at extremely cold temperatures. Frost accumulates easily and cannot be removed except by thawing. The recommended procedure is to shave at least twice a week if possible, or to trim the beard as frequently and as closely as possible, with a pair of scissors.

b. Body cleanliness. Winter survival in a snow house, parateepee, or less comfortable shelter is not conducive to bathing as most of us will realise. However, the importance of removing accumulated body oils and perspiration from the surface of the skin is greater for survival than under normal conditions. All waste material is a conductor, and tends to drain the precious supply of body heat. A good bath will boost morale and is certainly worth the effort. The requirements are a rag

(even a sock will do) and a container with warm water. Remove as many garments as you can comfortably and loosen the rest. Wet the rag, wring it over the container so as not to lose any water, and start washing under your clothing. It will be necessary to rinse the rag frequently to prevent dropping water on and in your clothing. When no water is available or it is impractical to bathe in this manner, dry scrubbing with a clean rag is well worth the effort. If it is impossible to bathe the entire body, be sure to get under the armpits and crotch, as these parts are more likely to become irritated by dirt. It is recommended that such procedures be followed at least once a week. Washing socks is of the utmost importance and is not difficult to accomplish. Underclothes likewise should be washed. A simple method is to tie them securely to a limb overhanging running water, or a pole prepared for the purpose. The action of running water will keep the clothing in motion and remove most of the dirt.

c. Oral hygiene. Another repugnant development of prolonged camping are "Fur Teeth" and mouth trouble. A toothbrush contributes greatly to morale in this case. If a toothbrush is not available, a piece of cloth can be used instead Feathers make fine toothpicks and several tied together can serve as a brush. The Hindu method of chewing a green stick until the end becomes "brushed" and then using it as a toothbrush is efficient and satisfactory. In survival, you generally have a large amount of time on your hands, and it is well worth while for you to use some of this time each day practicing oral hygiene. As a mouth wash or gargle, a bit of salt, either in water or on a brush, is quite satisfactory. Sea water, if available, provides a good mouth wash.

d. Elimination. Try to establish daily habits of defecation. However, limited food intake will naturally reduce eliminative requirements. If the necessity arises while away from the camp, don't be afraid of defacating regardless of temperature. You have sufficient body heat to prevent freezing of the exposed parts during the short period involved. Of course, you should take advantage of any available windbreak to reduce discomfort. During World War II a Medical Officer, living on experimental cold weather rations and traveling with a dog sled under survival conditions, allowed ten days without a bowel movement, with no ill effects, and on resuming normal diet, bowel movements followed. When diet consists of regulation pemmican, bowel movements practically cease. Avoid interrupting sleep in order to relieve yourself by drinking your liquids immediately after arising in the morning. Don't drink liquids before going to bed.

e. Mental hygiene. Some men who are forced to live under crowded conditions, such as that to be experienced in snowhouses, and parateepees, become irritable and "get on each other's nerves." History is filled with incidents where serious differences have developed between members of a party. Old timers expect such difficulties and have learned to accept hardships with patience and to behave in such a manne that they do not irritate their companions. Young men who have spent their lives in civilization, rarely understand the importance of the effect of their actions or behavior on the group, and, for this reason, are the worst offenders. Their offenses may be small, and might pass without notice in civilization, but when continued under crowded conditions, over a long period of time, will produce animosity on the part of

their companions. This is known as developing "bad blood" as the feeling of animosity among two or more men can destroy the physical efficiency of a whole party to a greater degree than illness or physical injury. In survival, most mental disturbances are caused by

(1) Uncleanliness while handling food.

(2) Dirty or ill-smelling clothing.

(3) Occupying more than a rightful amount of space in the shelter.

(4) Slackness on the job so that others are forced to do more than their share.

(5) Eating more than the right share of an alloted food ration.

(6) Constant complaining.

3. Camp Sanitation.

a. Latrine site. To prevent pollution of living areas. snow or ice which you may use later on for drinking or cooking water, select a special site for latrine. For obvious reasons, the latrine should be downhill from the camp and water supply, and downwind from the prevailing wind. As soon as possible, erect a windbreak for your latrine. Adhere strictly to latrine discipline, for you can never tell how long you will be forced to occupy the same camp site.

b. Garbage disposal. Select a dump area in an inconspicuous nearby location and dump all refuse there. A pit or slit trench should be dug so that it can be covered up when necessary. A disposal dump of this type is in line with basic rules of camp sanitation and will make you aware of other rules of sanitation and habits of cleanliness.

e. Cooking and eating utensils. Make certain that all utensils used in cooking and eating are thoroughly cleaned after using. It is preferable to clean this gear immediately after use, before any leftovers have had a chance to freeze. After leftovers are removed, most of the remaining grease, etc., may be removed by using sand or dry snow as a cleansing agent. Moss growing beside a brook or pond has roots impregnated with silt, which added to the moss, makes an excellent dish scourer and cleaner and does not scratch metal as much as sand. Scour and rinse all utensils in boiling water. Dirty cooking and eating utensils are one of the chief causes of diarrhea and dysentery.

d. Purification of water. Most of your water will be obtained from melting snow or ice and should be guarded against human waste pollution. If halazone or other chemicals are not available for water purification be sure to allow water to boil for at least one minute before it is used as drinking water. In cross country travel, one of the chief causes for fatigue arises from failure to drink water. In the northern wilderness, all water is pure. In the vicinity of settlements water is of course dangerous. However drinking water from hill or mountain streams is in most instances clean. It is better to drink frequently and in small quantities, because if you are hot, too much water will chill your stomach. Ill effects from this cause, frequently arise when a traveler who has not drunk water during the day, is suffering from thirst and drinks a large amount of ice cold water on reaching camp. A mistaken theory carried over a number of years, is that eating snow is harmful. Snow eating is beneficial, but it must be done correctly.

When temperatures are not too low, snow should be taken in the hand, compressed into an oblong form, like a stick of candy, and biting off pieces without allowing the water to wet your lips, chew it until it is melted, warmed up and then swallow. In very cold weather, the proper method is to scoop up some snow on your mitten and lick it as you would granulated sugar, a little at a time.

e. Ventilation. All shelters should have an effective ventilation system. This is especially necessary when a shelter loses its porousness through icing, and great care must be taken to guard against carbon monoxide poisoning. Such precautions are unnecessary in the parateepee and all lean-to type shelters.

RECOMMENDATIONS

1. From the foregoing lecture it should be obvious why personal hygiene and camp sanitation plays an important part for successful survival. Prompt, effective execution of daily chores and personal habits that are easy to perform and take relatively little time, are of paramount importance to men forced to live together for an extended period of time.

2. Problems of group-living under survival conditions are sufficiently serious and morale lowering, without added worries caused by:

a. Poor habits in personal cleanliness.

b. Bad behavior and sullen disposition of one or more men.

c. Breaches of discipline in camp sanitation.

3. An orderly camp and the team-work of a group depends on mutual respect and loyalty between members. In order to achieve this, every man must play his part. This allows for efficiency, health and morale and has a vital bearing on the health and efficiency of the entire group.

24 March 1950

LECTURE FOR INSTRUCTORS

BASIC SURVIVAL TRAINING

EMERGENCY FIRST AID (IMPROVISED)

I TITLE AND DURATION

a. Title. Emergency First Aid (Improvised).

b. Duration. One (1) hour.

II OBJECTIVE

At the conslusion of this period the student should know the basic requirements for prevention of, and the best treatment of the many emergencies which may confront him in survival when no medical aid or facilities are available to him.

III REFERENCES

a. Arctic Manual - TM 1-240.

b. Medical Department Soldiers' Handbook - TM 8-220.

IV TRAINING AIDS

None.

V PRESENTATION

This lecture is designed for medical instruction and indoctrination of those individuals who might find themselves isolated with no medical aid or equipment available to them and only nature and their ingenuity at their disposal. Under these conditions it is imperative if one is to survive that he adapt himself to his environment. He must meet and solve the physical as well as the psychological factors that present themselves. It is obvious that that individual who through proper planning and adjustment to his environment succeeds in avoiding illness and injuries has a far better chance of survival than the individual who succumbs to even a minor medical condition. Thus the major point of this presentation is that prophylaxis or preventive medicine is the thing to strive for, and therefore the major part of the discussion will deal with principles that aim towards this goal. Definitive treatment of illnesses and injuries, of necessity, must be primitive under these conditions. Specific treatment of serious illnesses and injuries would be impossible, and recovery would be governed by the physical stamina and resistance of the individual in conjunction with the kindness of nature. However, realize that nature is kind, and will cure the great majority of medical conditions if given a chance. The few measures mentioned herein are

those designed to aid nature in this job, and to prevent making the process of healing more difficult than it originally might have been.

Let me begin by emphasizing the importance of good preparation. In this respect, the keeping current at all times on all your immunizations is most important. This alone will protect you from many serious diseases that could be very prevalent under the conditions which this project contemplates. Further, it would be wise to be prepared at all times with respect to proper clothing. Never start on a mission without proper shoes, socks, underwear, clothes, and personal equipment. At present on many of our training flights, just the difference as to whether a man wears low cut shoes, or high shoes as he is supposed to, could mean the difference as to whether he survives or not. Yet we see the majority of individuals blindly continuing to ignore the rules and measures designed for their personal safety, simply because they believe they can count on no emergency. Usually they are right, but every so often someone gets caught short. Let us all get over this careless thinking and planning, and provide ourselves with every insurance possible.

More important than any specific thing I can tell you to do, or not to do in a certain situation, is to emphasize the necessity of your remaining calm and using your common sense. If each of you do this, you will properly evaluate each condition with the environment and situation present and know better what to do at the time than I could possibly hope to inform you. Thus, you would realize that if there is a reasonable possibility of getting trained medical aid in a reasonable time it would be wisest to wait, and do the minimum except for using general supportive measures, such as making a patient comfortable, keeping him warm, splinting fractures if they exist, and minimizing shock that might be present. Further, you would know never to move a man with a fractured bone until the fracture was splinted and properly immobilized. But circumstances may even force violation of this dictum, for if you are alone and have the fracture yourself, you will have to move to provide yourself with materials for splinting and to accomplish the job. Thus, let me emphasize again to keep cool and use your head and the right solution will present itself. Never allow yourself to feel that all is lost and that there is no hope. The history of our frontier days is full of episodes of seemingly hopeless medical situations in which an individual or a small group of individuals, all with less medical knowledge than any of you possess, overcame the situation by grit, guts, and the will to survive.

Now for a few general principles. Since we all realize that it is far better to prevent illness and injuries, if possible, than to try to cure them after they develop, we will consider a few prophylactic measures.

1. Practice good sanitation around your camp. This is especially important for even an overnight stop. Properly dispose of body wastes, garbage, and trash, so as to prevent contamination of equipment, food, and water, and also to eliminate areas that will attract insects and rodents or provide breeding places for them.

2. Keep your body and clothes as clean as possible. Cleanliness

will do much in preventing skin infections and vermin infestations. Much can be accomplished by washing without soap, although of course soap increases the efficiency and effectiveness of the procedure. Rinsing of clothes several times in plain water will clean them to a surprising extent. Wash your hands before eating if possible. Contaminated hands are an important factor in stomach and intestinal infections. Keeping your underwear clean will do much to avoid chafing and chapping of the skin in the crotch and armpits. Aside from the discomfort of these conditions and the pain caused by walking, they are a frequent cause of serious skin infections. Hand picking of vermin from the body and clothes, while tedious, can be quite effective, and should be diligently practiced inasmuch as fleas and lice carry and inject into your body the bugs that cause many serious diseases.

3. Care of the Feet. Many of the procedures mentioned here have already been stated, but due to the importance of ones feet they bear repeating. Keep your feet and socks clean. Keep your toe nails cleaned and cut. Remember to cut them, especially the large toe nails, straight across. Rounding of the corners is the most frequent cause of ingrown toe nails. Avoid wrinkles in your socks. If you get a pebble or foreign body in your shoe, stop and remove it. Wear wool socks and, if possible, keep holes in your socks darned smoothly. All these procedures will do much in avoiding feet infections, frostbite, blisters, scalding, and irritation of the skin. Your feet will be your only means of transportation. Treat them with the greatest care and respect.

4. Food. Avoid the use of foods that might be poison such as mushrooms and peculiar looking fish unless you are positive that they are fit to eat. Be sure that all food you eat is well cooked, especially meat, since trichinosis (a small worm that gets into your muscles and causes severe pain and illness) is common among animals and apparently is quite frequently found in arctic animals. This disease is acquired by eating infected meat, but is easily prevented by simply thoroughly cooking the infected meat. Thorough cooking means getting the temperature at the center of each piece of meat to a temperature of 140° F. This is much below the boiling temperature of water (212° F), so you see that the trichinae are actually easily killed. Also you will realize that it is wise to cook your meat in small pieces to insure that a sufficient temperature is reached at the center of each piece of meat. Moreover, the trichinae are killed by exposure to a temperature of -30° F, 24 hours at a temperature of -2° F, or twenty days at 5° F. Thus, in the arctic during the winter months much of your meat would automatically be made safe for you. Left-over foods should be protected from contamination. Any food that is questionably spoiled that must be eaten because of scarcity of foodstuffs should be thoroughly cooked prior to eating. This will destroy all bacteria and most bacterial poisons and will prevent or lessen the degree of sickness you get.

5. Water. Be sure your drinking water is potable and safe. If there is a question, boiling for ten minutes will make it safe, and in most conditions just a few minutes will suffice. If you can't boil it, let it stand so that all foreign material will settle to the bottom,

carefully pour off the clear water, and then churn this clear part vigorously so that air becomes well mixed with it. Then let it stand in the sunlight for a while, for some germs are easily killed by plenty of air and sunlight.

6. Ground Safety. Avoid or be very careful in all activities that might result in injuries. Make yourself so conscious of accident prevention that you never initiate any unnecessary activity that might result in injury, and that any necessary or desirable act is planned so it is performed with the least possible hazard. If in the arctic, always be aware of the possibility of snow blindness. This is actually sunburn of the eyeballs manifested by blindness, tearing, bloodshot eyes, swollen eye lids, and intense eye pain. This can occur, like sunburn, even on an overcast day. Prevention is accomplished by wearing colored glasses if available. If not available, a thin slab of wood tied across the eyes with a slit to see through will give good prevention. Likewise, avoid sunburn of any of the body surface. This is accomplished by keeping the skin covered. Frostbite is another condition to carefully guard against; proper clothing and avoidance of exposure to severe cold, especially when the wind is blowing, are the only preventives. Proper clothing is most important. Learn the habit of ventilating garments or shedding garments before activity causes sweating. Never allow the clothes to become damp from perspiration. This frequently will result in frostbite. Along the same line it is extremely important that if one gets any part or all of himself or his clothes wet, he must stop at once, build a fire, and dry himself and his clothes. On cold windy days keep the possibility of frostbite in mind. Watch particularly the ears, nose, cheekbones, forehead, and fingers. Its occurrence is recognized by whitening of the area involved. Pain is severe. If in a hot area, avoid the possibility of sun stroke or exhaustation by keeping the head covered when in the direct sun, and by drinking plenty of water. Extra salt should be taken when sweating excessively, if it is available. Avoid contact with poisonous plants such as poison oak, ivy, and sumac. These plants can cause severe and disabling skin inflammation.

Now as to the treatment of these conditions if they occur.

1. Skin Infections. Frequent cleansing with soap and water is the best treatment. If the condition is just chafing or chapping, some oil, blubber, fat, butter, mineral oil or vaseline applied after washing the area will be most soothing. In an infection which is accompanied by local swelling and redness, hot, wet compresses are the best treatment. Any bulky piece of cloth about the size of a bath towel, wrung out of hot water, and folded over the area will suffice. A smaller compress which has been boiled and thus sterilized placed directly over the infection will aid in preventing further contamination of the area. The compress should be changed as often as necessary to maintain heat. This should be done for several hours each day. In the absence of a piece of cloth for this job, soft bark, leaves, or moss will suffice. When the infection is localized, or comes to a head, the skin above the yellow or white pus must be cut to allow it to drain out so the infection will heal. If a knife blade is used it should first be held in boiling water for one minute or

heated hot with a match or cigarette lighter Be generous in the size of your incision, otherwise it will heal before drainage has stopped and you will have to repeat the job. Gently express all pus from the wound. This same treatment is applicable to boils. In the absence of a knife, any sharp object, even a freshly peeled sharp stick, may be used.

2. Ingrown toe nails. Keep the feet clean. Clean thoroughly under the ingrown nail. One can often raise the corner of the nail and allow it to grow out by inserting under it a thin small object such as a wisp of cotton, a double thickness of tinfoil, or a thin small sliver of wood. Also, scraping the middle part of the nail thin so that the edges of the nail can be raised more easily will aid in correcting the condition. If such a nail becomes infected, soak the foot in hot water for thirty minutes three to four times each day until the infection is healed.

3. Blistered Feet. Keep the feet and socks well cleaned. Don't puncture the blister unless absolutely necessary as it contains a sterile serum cushion. If the blister heals without breaking the chances of it getting infected are greatly decreased. If necessary to puncture the blister use a sharp object that has been sterilized by boiling or flaming. Eliminate the cause of the blister.

4. Food poisoning or so-called ptomaine poisoning. As soon as you are aware of the condition, drink several glasses of warm water, and then stick your finger down your throat until all the water is vomited up. Repeat this stomach washing two or three times. Little can be done for diarrhea until nature takes care of it. Remain quiet. Drink as much water as possible without causing nausea and vomiting. The same treatment should be followed if poison foods such as poison mushrooms or fish are eaten.

5. Wounds. Free bleeding of a wound is desirable if it stops short of excessive loss of blood. This tends to wash out any contamination or foreign material from the wound. If bleeding is very scant or obvious foreign material is in the wound, profuse irrigation of the wound with warm freshly boiled water will often clean it up. If foreign material is still present, it could probably be removed with two small pointed sticks, the ends of which were boiled or flamed. After the wound is cleaned, bandage with material (strips of shirt, underwear, parachute, etc.) that has been boiled for ten minutes. Draw the edges of the wound as close together with the bandage as possible. This will result in more rapid healing. A wound that becomes infected is best treated with frequent hot wet compresses as described for skin infections.

6. Sprains. Immediate application of a cold compress for one to two hours followed by tight binding or strapping of the joint will often enable one to go ahead and use the joint, even though it be a sprained ankle or knee. Probably the binding will have to be loosened at intervals at first, and later tightened as swelling subsides. It should be kept as tight as possible as long as it does not interfere with circulation to the part or cause excessive pain. If this procedure can be followed it will usually result in less swelling and more rapid healing than if complete rest is given the joint. Of course, this usually cannot be done if a

fracture of a bone is present, as well as the sprain. Severe pain will let the patient know that this is the case.

If the above procedure cannot be followed, continue the cold compresses for twenty-four hours. Follow this with frequent hot compresses or soaks. Never apply anything colder than a compress wrung out of water at 0°C (32° F).

Bruises. The same as for sprains, that is, twenty-four hours of cold compresses followed by frequent hot compresses.

7. Snowblindness. Complete rest of the eyes (3 days to 2 weeks, depending on severity). Cold compresses as described above for thirty minutes at a time, four to five times each day. In addition, irrigate the eyes with boiled sterile water of the temperature of the body by lying flat, holding the eye lids open, and gently pouring a stream of the water into the eyes.

8. Sunburn. Application of any oil as for chafing will be soothing.

9. Frostbite. Avoid all rubbing or massage of the involved areas. Do not apply snow or ice to the areas. These measures only make the condition worse. It is important to thaw or warm the areas to body temperature as soon as possible. This is best done by dipping the affected parts in water that is six to eight degrees warmer than body temperature. Or apply warm wet compresses to the affected parts using water of the same temperature as above. After rapid thawing is accomplished, apply a pressure dressing, if possible, before swelling sets in. This is done by covering the frostbitten areas with a sterile dressing. Then place some resilient material such as lamb's wool (very good), cotton, paper wadding, dried grass or moss, over the area and bind fairly firmly. Every attempt should be made to get very even pressure with the dressing. Otherwise, points of increased pressure are apt to die and become necrotic. The ears are not difficult to bandage in this way. However, you will find considerable difficulty applying this bandage to the nose or fingers. If the bandage cannot be contrived, merely accomplish the rapid thawing and avoid exposure to cold without adequate protection until healing has occurred.

10. Ivy Poisoning, etc. The skin inflammation is caused by an acid secretion of the poison ivy, sumac, or oak. As soon as one is aware of the poisoning as evidenced by reddening and itching of the skin, wash thoroughly several times with soap and large amounts of water. If no soap is available, use wood ashes. This will generally neutralize the acid and the inflammation will subside in a day or so. If the case is further advanced before treatment so that swelling of the area and blisters have appeared, the same treatment should be applied, followed by frequent warm wet compresses.

11. Burns and Scalds. Apply some bland oil such as mineral oil, blubber, suet, fat or butter. If the area is small, this is probably all that is needed. If the burn is more extensive, a pressure dressing should

be applied as for frost bite. Do not break the blisters. The burn undoubtedly will become infected in three to five days. Despite the odor that may develop leave the dressing on until the eighth to tenth day unless symptoms such as pain, chills, or high fever develop. If the above symptoms develop remove the dressing and start continuous hot wet compresses on the infected areas. Also use the continuous hot wet compresses on any infected area after the bandages are removed on or about the tenth day.

12. Hernia. This may result from violent exertion, overlifting, or other causes. It is simply a protrusion of some part of the abdominal contents through the abdominal wall. It usually is a loop of intestine. The immediate concern is to get the herniated contents back into the abdominal cavity before swelling of the tissue shuts off the blood supply to the part and results in death of the tissue. To accomplish this the patient should lie down on his back with a pad under his hips and his thighs drawn up towards his body. While breathing evenly and naturally gently press the mass back in line with the middle of the canal through which it has descended. If a little manipulation does not accomplish its return, apply cold compresses for an hour and try again. Do not continue manipulation long enough to cause irritation and inflammation. After reduction has been accomplished, place a tight bandage over the area. The most frequent sites for hernias are in the groins, but they may occur anywhere in the abdominal wall.

13. Gunshot Wounds. If the wound is only a flesh wound from a rifle or a pistol, simply apply a sterile (boiled) compress bandage and bind it tightly in place. If a bone is broken, splint it. If the bullet has not gone through and is deeply embedded, leave it alone. Do not attempt to probe for it and remove it. The chances are that it will cause no serious harm. If bits of clothing have been driven into the wound, attempt to remove them even though it involves a small amount of cutting, but do it in as sterile and clean a manner as possible. Do not attempt to remove shot from a shot gun wound unless the shot is easily available. They will do less harm probably than extensive non-sterile manipulation of the wound. Keep the patient quiet so as not to renew bleeding. Treat for shock.

14. Shock. The patient suffering from shock should be kept quiet. He should be placed in a reclining position with his head four to six inches lower than his feet. Any hemorrhage present should be controlled. Fractures should be splinted. The patient should be kept warm. External heat should be applied. Wrapped canteens can be used as hot water bottles. Heated rocks or sand can be used similarly. Care must be exercised that excessive heat is not obtained and the patient burned. The best places to apply external heat are between the thighs and along the sides of the chest. Rubbing the limbs towards the body may be of value in aiding return blood flow to the heart, providing it does not result in chilling the patient. If he is conscious, a hot drink will be of value. Of course, a stimulating drink such as hot coffee or tea would be best.

15. Foreign Bodies in the Eye. If one gets a foreign body in his eye, take immediate steps to remove it. Don't rub or press on the eye

under any circumstances. Often pulling the upper lid over the lower lid and holding it there until considerably tearing has occurred will wash the object away. Closing the nostril on the other side and blowing the nose hard will often increase the tearing. If this is unsuccessful, next one should try profuse irrigations of the eye with boiled sterile water at the temperature of the body. This failing, the final procedure is to locate the object and remove it with a small piece of sterile (boiled) soft cotton. To locate the foreign object, first examine the central part of the eye **not** covered by the lids. This area is greatly increased by looking up, down, and to the sides. Don't be surprised if the object turns out to be so small that it can hardly be seen. Next pull the lower lid down and have patient look up. Finally, one must look under the upper lid. This is accomplished by having the patient sit down with his head bent backwards. Stand behind him, place a match or small twig across the upper lid one-half inch from its edge, and turn the lid up and back over the match. The foreign body may be found sticking to the inner surface of either of the eyelids, but is more likely to be stuck to the surface of the eyeball. If one waits to remove the object until the eye begins to swell, the task becomes much more difficult and also one has an eye infection as a complication. Remember to work very gently around the eye as it is a very delicate organ.

I have assumed that all of you have had basic first aid instruction and know such fundamentals as artificial resuscitation from drowning, suffocation, and electical shock; proper splinting of fractures; control of hemorrhage by pressure dressings, elevation of the bleeding part, absolute quiet on the part of the patient, pressure to arterial points, and by the use of tourniquets; and proper transportation of a wounded patient. These are items that all Air Force personnel are supposed to know. If there are any of you who do not possess this fundamental knowledge, he should take steps immediately to acquire it. However, this is not the appropriate time or place to consider them.

In conclusion, I might discuss briefly some of the psychological and mental factors involved in such a venture. Any mission against an enemy will be approached with a certain amount of fear and anxiety. It is certain that this fear and anxiety will be well controlled by each individual and in no way will interfere with the efficient accomplishment of his duty. In fact, it may lead to more vigorous and better prosecution of the task ahead than if it were not present. This underlying emotion may be aggravated by enemy action and interception. The extent will depend greatly on the effectiveness and extent of these counter-measures. In addition, there will be superimposed a certain amount of fatigue depending mainly on the length of the mission and the amount of tension in each individual. If it became necessary to abandon the aircraft or to crash land it over enemy territory, it would probably be under these circumstances. Then consider the reaction to finding oneself in an enemy territory -- someone that is hunted. In addition, climate may be very unfriendly, and certain injuries may have been received in leaving the aircraft. You may say that this all adds up to a very discouraging picture. It does. And I only paint it so you can know what to expect if such an occasion ever arises. It is sufficient to make a man lose his head and not show proper judgment at what might be a crucial time. However, to be aware before hand of the mental factors at play would be to be forearmed, so that one could properly

evaluate the total picture and act more wisely.

If an individual receives relatively serious injuries at the time of escape from the aircraft or later, there will always be the decision to be made as to whether it would be wiser to turn in to the enemy forces or to attempt escape and survival. This is a decision that each individual or group of individuals will have to make, depending entirely on the environment, location, situation, and degree of injury. If a group of individuals are together it will pose the further problem of whether the whole group turns in or just the injured ones.

There will be the psychological factors that will arise from being hunted, living under primitive conditions, and having to gain your subsistence from an unfriendly environment. There will be the additional factor of isolation which will be accentuated the fewer there are in the group. Some of you will find the types of food available to you aesthetically offensive. Each of you must overcome this finickiness and approach the problem with the idea that no matter how strange the food is or how bad it may taste that you can and will eat it, if you are reasonably certain that it will not make you ill and will provide you with food. Be prepared to eat blood, horse, mule, dog, cat, rats, snakes, and all sorts of birds and fish. If you overcome your emotions, you will be surprised at how normal and good most strange and unusual foods taste. If in a group some may face the psychological factors of discouragement and frustration that will develop from poor leadership.

There may be such problems arise as to disposition of an enemy civilian that wanders on your group. Is it wiser to dispose of him and continue escape tactics with another mark against you, to trust that he will not turn you in, or to attempt to escape from the area despite the information he may give?

All in all, I do not think one need be concerned about these stresses and anxieties if he is aware that they will exist. Just this knowledge will have a potent neutralizing effect upon them. The will to survive is strong, and one must decide that he will remain calm and choose wisely with discrimination and logic the most favorable path, despite discomfort of being cold, hungry, and wet, and despite the psychological factors that alone might make a weak man say survival and escape were not worth the effort.

Finally, each of you should know and be prepared for the fact that the time of greatest difficulty with respect to the mental and psychological forces will be when he is finally successful in his escape and again finds himself in the comfortable, sympathetic, and helpful society of his friends and countrymen.

9 MARCH 1950

LECTURE FOR INSTRUCTORS

BASIC SURVIVAL TRAINING

I. TITLE AND DURATION

a. Title - HISTORY OF ROTENTONE, DERRIS.

b. Duration - One-half (½) academic hour.

II. OBJECTIVES

At the conclusion of this period the student should know:

a. Regions where fish poisoning plants grow and method of mixing and using same.

b. Action of plant poisoning on fish.

c. Effect of water temperature on action of poison.

d. New developments in the use of Derris.

e. Caution in use of Derris.

f. Use of lime in poisoning fish.

III. REFERENCES

a. Selective poisoning of fish. Trans Am. Soc. 70;80-86
John Greenbank - 1941

b. Notes on the use of Derris as a fish poison.
Trans Am. Fish Soc. 68;269-280 - J.W. Leonard - 1939

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HISTORY OF ROTENTONE

Throughout warm regions of the world there are various plants utilized by natives for poisoning fish. The most common method of using them, is to macerate or crush the plant parts (most often roots) and mix this in water. Drop large quantities of the crushed plants into the heads of pools or small streams containing fish, and within a short time, the fish rise helpless to the surface. The poisonous principle is usually rontentone, which is harmful to cold blooded animals, but the fish killed by it may be consumed by man without any ill effects whatsoever.

Rotentone has been found only in the members of the family of plants to which the pea and bean are members (Leguminosae). The most common rotentone producing plant of this family has been given the scientific name of DERRIS, which is also the common name used in this country.

Derris is a native of Australia, Oceania and Southern Asia, whereas CUBE, another form, is found in South American. The commercial Derris or Cube powders are the ground roots of the Rotentone bearing plants.

ACTION OF DERRIS ON FISH

When a pond or stream is treated with Derris, the fish die of suffocation, caused when the capillaries in the gills of the fish shrink to a diameter which does not permit the passage of the oxygen bearing red blood cells. In other words, the circulation in the region of the gills is cut off and the blood stream is no longer able to supply the organs of the body with oxygen necessary for certain body functions. It has been ascertained that poisoned fish will recover if rescued from treated water at the first signs of distress and placed in untreated water.

COMMERCIAL DERRIS

Commercial Derris or Rotentone can be used essentially like the crushed derris roots prepared by natives. It has no effect if dusted on the surface of the water. It must be mixed to a chocolate malted milk consistency with a little water, then distributed in the water containing fish. If the concentration is strong, it will work within two minutes at a water temperature of 70 degrees F. It will take approximately one hour at water temperature of 50 degrees F.

An ounce of 12 per cent derris will kill every fish for one-half mile down stream in a body of water 40 feet wide.

Derris must be kept in sealed containers and the containers should be dark colored.

NEW DEVELOPMENTS IN USE OF DERRIS

Usage in higher concentrations and in tablet form is now under development and will shortly be available for survival purposes. An acetone extract of rotentone roots, whereby only a few drops need be put in a stream or pond, is also under development.

USE IN COLD WATER

The warmer the water, the quicker the reaction, but the EFFECTIVENESS IN COLD WATER IS RETARDED RATHER THAN REDUCED.

CAUTION IN USE OF DERRIS

The laws of all states and territories prohibit the use of all toxic poisons in public waters.

Rotentone, Derris or Cube powders may cause nose and throat irritations if the powder is inhaled.

OTHER METHODS OF POISONING FISH

Lime, thrown into a small pond or tidal pool, will kill all the fish in the pool. In order to obtain lime, burn coral and sea shells.